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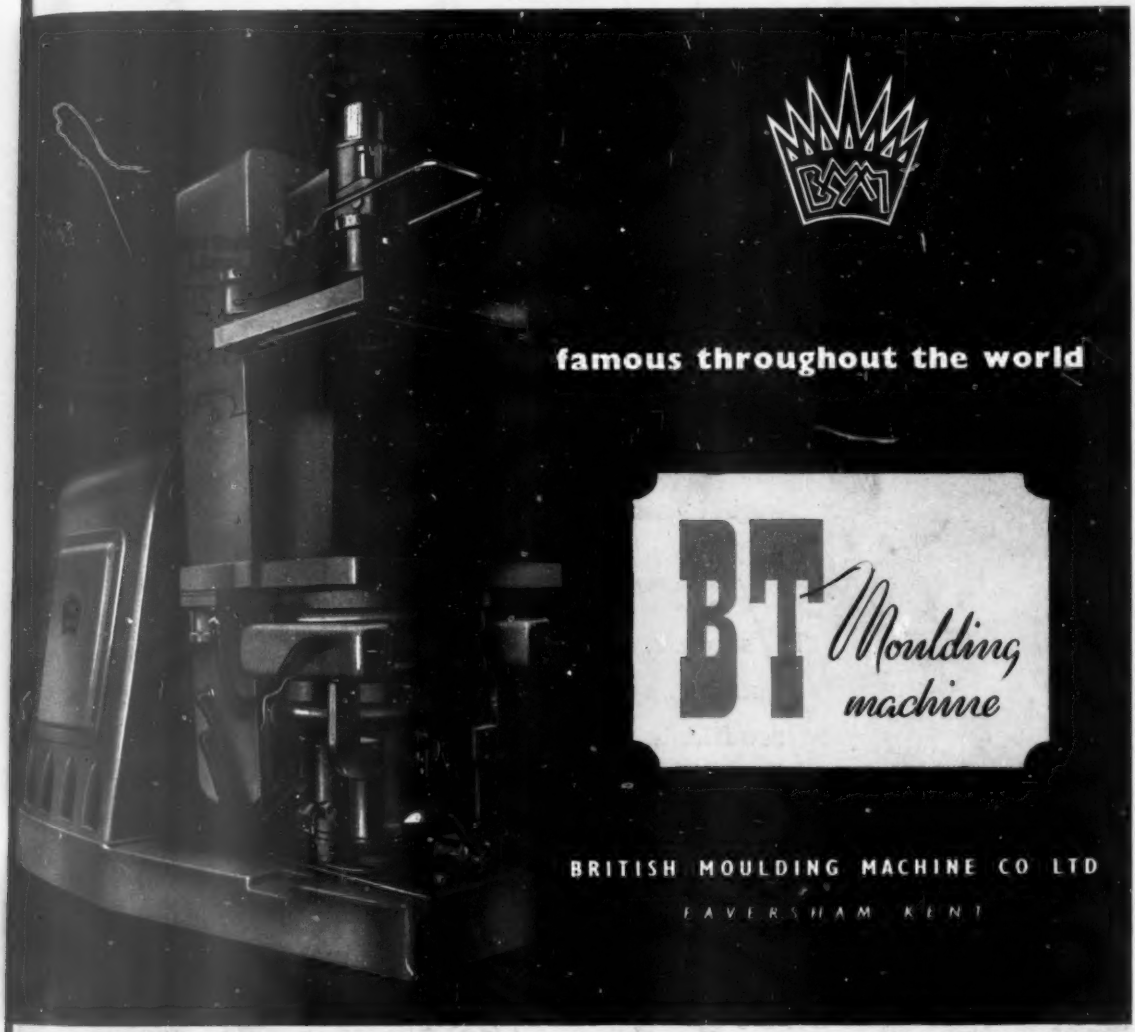

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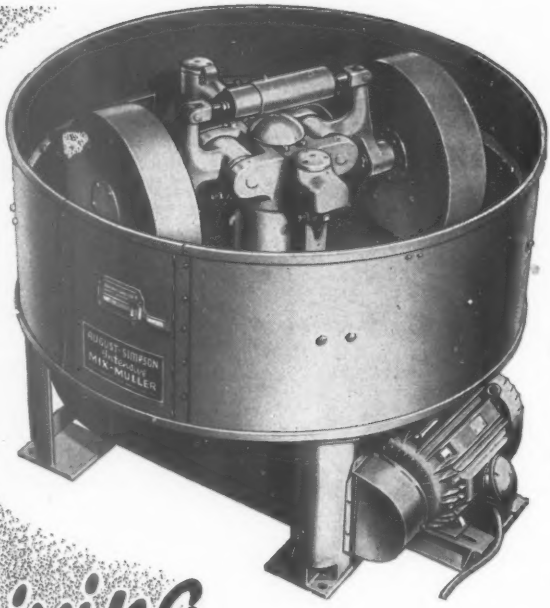

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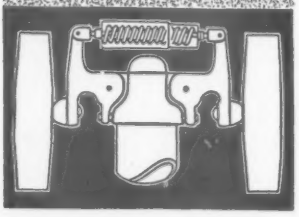

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Factory Report 1953*

The appearance of this Annual Report of the Chief Inspector of Factories at the end of last month is a matter for congratulation, as in recent times the Report has been so belated as to detract from its interest. Whilst it is to be regretted that there was an increase in the total number of accidents in 1953—181,637 as against 177,510 in 1952—there is some ground for satisfaction in that the accidents in foundries were reduced from 11,263 to 9,999—that is, by 1,264. The number recorded for 1953 is the lowest for some years. However, Sir George Barnett, the Chief Inspector of Factories, ascribes this reduction partly to decreased employment and to the fact that departments other than those undertaking actual castings manufacture are included in the returns. He feels that the figure of 60 accidents per 1,000 workers per year is not exceptional, but does agree that some of the decrease in 1953 is due to the fact that the considerable effort being put into accident-prevention measures is showing results.

Whilst, as in other industries, the major proportion of accidents results from handling of goods, the next most prolific source is due to molten metal. Many of these accidents result from causes to be related to the old adage "familiarity breeds contempt." Molten metal must always be potentially dangerous, and youngsters require this fact to be constantly drilled into them. The Chief Inspector expressed himself forcibly on this subject:—"Allowing young persons to be injured or killed is a form of extravagance in which British industry cannot afford to indulge."

A wise suggestion made in the Report is that old people should be allowed to leave the works a few minutes before clocking-off time in order that they are not subjected to the turmoil of the rush for transport. Whilst there are still objections by the men as to the wearing of goggles—some going so far as to say they are the cause of accidents, due to steaming—yet, statistically, thanks to the campaign for eye protection, much progress has been made. A decrease from 1,027 in 1948 to 779 eye accidents in 1953 reflects the benefits achieved. A table is included in the Report of accidents in a mechanized shop employing 2,000 persons. Altogether, there were 80 accidents, and these follow the pattern of industry in general. There were but few machinery and molten-metal accidents, and most were due to persons being struck by falling bodies—no doubt dropping from conveyors. The Report carries a special section dealing with foundries and it is our earnest wish that the future will see the deletion of this unwelcome advertisement as being no longer worth featuring.

* Annual Report of the Chief Inspector of Factories for the year 1953; published by H. M. Stationery Office, York House, Kingsway, London W.C.2; price 6s. 6d. net

SIR PERCY LISTER

Chairman and Managing Director, R. A. Lister & Company Limited.

Leaders of the Industry

SIR PERCY LISTER

SIR Percy Lister was born on July 15, 1897, the third son of Charles Ashton Lister, C.B.E., J.P., of Dursley in Gloucestershire. He received his education at Mill Hill, passing from there directly into the Royal Military College, Sandhurst, whence he received a regular army commission to the 18th Q.M.O. Royal Hussars. Having served with his regiment in France, Belgium and Germany and in England, he resigned his commission and entered—on October 1, 1919—the family business, founded by his grandfather in 1867. He became a director in 1921, managing director in 1926 and chairman in 1934. In 1936 he was appointed chairman of Blackstone & Company, Limited, when it became a wholly-owned subsidiary of his own company.

During the past thirty years, Sir Percy has travelled very extensively, spending some six months of the year abroad on the company's business, and has established subsidiary companies in Canada, the United States, the Argentine, Belgium, France, Australia and—in association with Harrisons & Crosfield—in Malaya, Indonesia, Siam and Ceylon. The vast expansion in export trade of his own group as well as the export trade of other companies with whom Sir Percy has been directly or indirectly associated, reflects the efforts he has made, the value of his contacts and the goodwill he has produced on his wide and frequent travels.

He was appointed managing director of the Treasury-owned United Kingdom Commercial Corporation, for whom he travelled extensively during the war in the Iberian Peninsula, and South and North America, and was responsible for their activities in the United States and Canada, and the creation and negotiation for the combined economic warfare purchasing activity and the final liquidation of these activities in the Iberian Peninsula.

On the cessation of hostilities, he made a second world tour on behalf of his companies, and was made a member of the Capital Issues Committee in 1946. He became the executive director of the Dollar Export Board in 1948, and was largely responsible for creating the allied organizations in Canada and the U.S.A.

He became a member of the Dollar Export Council in 1951 and of the Iron and Steel Board upon its formation in 1953. He is on the Board of Sir Armstrong Whitworth & Company (Engineers), Limited and Broom & Wade, Limited as well as subsidiary and associated companies within the Lister group.

He has served for many years on the Council of the Australian Association of British Manufacturers and on both the executive committee and Council of the Federation of British Industries. He is a past chairman of the British Engineers' Association Export Committee.

Sir Percy was for many years a keen follower of the Berkeley and Beaufort hounds and was for a considerable time joint honorary treasurer of the Gloucestershire County Cricket Club. He is president of the Stinchcombe Hill Golf Club, vice-president of the Severn Wildfowl Trust and a member of the Cavalry Club and the R.C.Y.C.

Institute of Metals Awards

The Council of the Institute of Metals has made the following awards of medals:

Institute of Metals Platinum Medal (1955) to Dr. Colin James Smithells, MC, FIM, director of research, the British Aluminium Company, Limited, Gerrards Cross, in recognition of his services to metallurgical science, to the metal industries, and to the metallurgical profession.

Rosenhain Medal (1955) to Dr. William Albert Baker, FIM., research manager, British Non-Ferrous Metals Research Association, London, in recognition of his outstanding contributions to knowledge in the field of physical metallurgy, with special reference to the influences of gases and shrinkage on the soundness of cast metals.

W. H. A. Robertson Medal and Premium (1954) to Professor Hugh Ford and Mr. J. G. Wistreich for their paper on "Problems of the Control of Dimension, Shape and Finish in the Rolling of Sheet and Strip and in the Drawing of Wire."

The medal and premium of fifty guineas, placed at the Council's disposal by W. H. A. Robertson & Company, Limited, is awarded annually for the encouragement of the writing and publication of papers on engineering aspects of non-ferrous metallurgy. Manuscripts of such papers should be addressed, in the normal way, to the Secretary, Institute of Metals, 4 Grosvenor Gardens, London, S.W.1.

Productivity Council's Officials

Sir Ewart Smith, technical director of Imperial Chemical Industries, Limited, has succeeded Mr. Tom Williamson, general secretary of the National Union of General and Municipal Workers, as chairman of the British Productivity Council. Mr. J. Crawford, general president of the National Union of Boot and Shoe Operatives, member of the General Council of the Trades Union Congress and chairman of the TUC production committee, has been elected deputy chairman.

Four members of the Council have retired—Sir Cuthbert Clegg and Mr. A. G. Stewart, of the British Employers' Confederation, and Sir William Lawther and Mr. Jack Tanner of the Trades Union Congress.

Five new members were elected: Mr. G. Pollock, director, British Employers' Confederation; Mr. W. T. Winterbottom, vice-president, BEC, and chairman Fine Spinners & Doublers, Limited; Mr. H. Collison, general secretary, National Union of Agricultural Workers; Mr. W. E. Jones, president, National Union of Mineworkers; and Mr. R. Openshaw, general president, Amalgamated Engineering Union.

Latest Foundry Statistics

According to the Council of Ironfoundry Associations, the number employed in iron foundries at October 30, 1954, was 140,952, of whom 131,169 were males and 9,783 females. As compared with the figures issued on October 2, there is a gain of 778, but a decrease of 155 when related to the end of October, 1953. A feature of these latest statistics is the increase of nearly 250 females (2.6 per cent.) as compared with last year's figures.

According to the Ministry of Supply, the output of aluminium castings during October was 1,848 tons as sand castings; 4,084 tons as gravity-die and 1,447 tons as pressure-die-casting. All these show an increase over the monthly average figures.

New Year Honours

A number of foundrymen and others in kindred industries were recipients of New Year Honours, the lists of which were announced last Saturday. Mention is made below of a few of the awards, and further details will be printed in the next issue of the JOURNAL.

BARONS

EDGAR DOUGLAS ADRIAN, O.M., president of the Royal Society; president of the British Association; Master of Trinity College, Cambridge.

KNIGHTS BACHELOR

IVOR RICHARD COX, for services as managing director, Metropolitan-Vickers Electrical Company, Limited.

WILFRED JOHN NEDEN, chief industrial commissioner, Ministry of Labour and National Service.

REAR-ADMIRAL MATTHEW SAUSSE SLATTERY (retd.), chairman and managing director, Short Brothers and Harland, Limited, Belfast.

HENRY SPURRIER, managing director, Leyland Motors, Limited.

ORDER OF THE BATH

Civil Division

GCB

SIR JOHN PRIMATT REDCLIFFE MAUD, Permanent Secretary, Ministry of Fuel and Power.

CB

G. R. D. HOGG, under secretary, Department of Scientific and Industrial Research; W. R. MCGAW, director-general of aircraft production, Ministry of Supply.

ORDER OF ST. MICHAEL AND ST. GEORGE

CMG

E. W. SENIOR, commercial director, British Iron and Steel Federation.

ORDER OF THE BRITISH EMPIRE

Civil Division

CBE

L. CHAPMAN, managing director, Wm. Jessop and Sons, Limited; H. E. JACKSON, lately president, British Non-Ferrous Metals Federation; V. A. PATTERSON, deputy chairman and managing director, J. and E. Hall, Limited.

OBE

G. D. ELLIOTT, works manager (iron) Appleby-Frodingham branch of United Steel Companies, Limited; W. J. FELTON, secretary, Institute of Mining and Metallurgy; F. A. GOULD, lately senior principal scientific officer, National Physical Laboratory; P. L. GOULD, director, Goulds Foundries, Limited, member Welsh Board for Industry; CAPT. J. H. J. MARTIN, works manager, Elswick & Scotswood Works, Vickers-Armstrongs, Limited; V. W. M. ROBERTS, British Thomson-Houston Company, Limited.

BSCRA Appointments. Dr. R. J. Sarjant, OBE, DSC. FIM, has been appointed director of research of the British Steel Castings Research Association, and Dr. A. H. Sully, MSC, FINSTP, FIM, has been appointed associate director of research. Dr. Sully who is at present head of the metallurgy division of the Fulmer Research Institute will take up his new appointment in March.

Exhaust Ventilation of the Patternshop

By E. Bradley

Foundrymen have recently been much concerned with moderately fine dusts such as are met with in average foundry grinding and polishing shops. Turning attention to the patternshop, however, although the same principal factors make up the general problem, the material to be handled, namely, wood refuse, is different, both in nature and particle size, and methods have to be applied taking these factors into consideration. This article details suitable methods and outlines the theoretical grounds upon which rates of extraction are based.

In the patternshop the shape, size, and positioning of an exhaust hood is of paramount importance, and is effective, perhaps more than any other single factor, towards the success or failure of the system. The material to be handled is for the most part bulky, therefore the hood branches must be of sufficient area to prevent choking, and the air velocity sufficiently high to maintain the material suspended in the air-stream during its journey to a satisfactory conclusion at the terminal unit. "Mrs. Beaton" commenced her famous recipe for jugged hare:—"First catch your hare——" and this, in a measure, is also the initial problem when exhausting a patternshop, for the machine hood should be so designed and positioned that the flying dust or wood refuse is immediately entrained and swept into the hood branch.

Typical Exhaust Hoods

The chief purpose of the machine hood is to create general air flow past the dust source and away from the workman or operator. The effectiveness of this hood is in removing dust-contaminated air, and ensuring that the air around the workman is free from pathologically dangerous concentrations. In dealing with woodworking machinery, however, there are large particles of refuse thrown with considerable speed from the cutter or other form of tool, and these particles often cannot be captured economically with the type of hood remote from the dust source. Advantage is taken of the predictable trajectory of the dust whenever possible, and the hood designed and positioned so that the material is thrown by the cutter into the zone of maximum air-velocity, preferably directly into the throat of the hood branch. The application of this general rule of design will be illustrated in examples to follow later; it should be remembered that a hood so designed will deal not only with the larger and bulkier material, but also will clear the fine and dangerous particles effectively.

When laying out an exhaust system for a woodworking machine-shop, it is the practice of some designers to assume that only a certain proportion of the machines will be working at any given time, and so to provide for lower fan-power, and in some cases smaller mains-ducting than would otherwise be the case. When this method is followed, each separate machine should be provided with a blast gate in the hood branch, so that any machine not in use can be shut off from the system. It is nevertheless questionable whether there is any real advantage in being frugal with fan-power. A possible exception may be made in the case of floor sweeps, as they are often only in use when the principal machines, or a portion of them in any case, are shut down, so that it is not essential to include them in the computation of air volume required. Where several floor sweeps are installed, however, as on the larger plants, one in every three should be accounted for.

"Tailor-made" Plant

The design of an exhaust system would be considerably simplified were one able to select standard hoods of known characteristics from catalogues or manufacturers' tables, but this of course is not possible, as the great variety of types and makes of machines (even of the same class) and the great difference in character of work performed by each type of machine, makes standardization extremely difficult. The great majority of machine hoods are, therefore, of necessity made to measure, and arranged to suit the individual machine. The hoods now to be described are intended to illustrate the fundamental principles involved, and to show the basis of application to various types of machines. Their purpose, in general terms, is the removal of large quantities of bulky material rather than the entrapment of fine dusts, and it will be noted, therefore, that most of the woodworking machine hoods illustrated are shaped to follow the trajectory of the flying refuse material as it leaves the cutter. All machine hoods should of course be robust in construction and be well assembled; this applies particularly in the case of woodworking-machine hoods, which are perhaps subject to more severe usage than many other types. Advantage should be taken of sliding and telescopic members wherever necessary, and when the hood has been fitted, it must not "get in the workman's way" or interfere with the effective operation of the machine.

Planer Hoods

The planing machine, as used in the average patternshop, so far as the exhaust hood is concerned, is a typical example of a large variety of similar machines using a series of rotating blades or cutters. Generally, the flying chips will be thrown off from the knives, either almost vertically, or in a curved path, depending on the construction of the chip breaker. Fig. 1 shows in outline, the straight-hopper type of hood required to deal with chips flying vertically, and Fig. 2 the shape of hood which

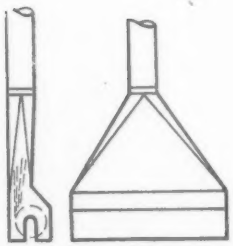


FIG. 1. — *Straight-hopper type of hood required to deal with chips flying vertically.*

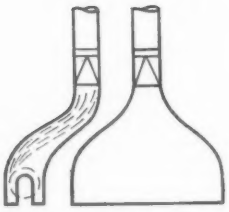


FIG. 2. — *Hood designed to collect chips moving with a curved trajectory.*

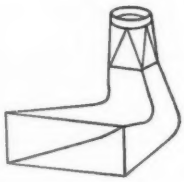


FIG. 3.—*Typical hood for a shaper, usually arranged with a high static suction.*

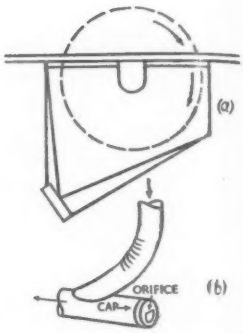


FIG. 4. — (*a*) *Hopper-type hood for a circular saw—fitted below the table;* (*b*) *device for admitting extra air at floor level.*

follows a curved trajectory. Whenever possible, the hoods for planers should be developed from the actual chip trajectory. By running a few boards through the machine, simple measurements can be taken fixing the general path of the flying chips. The outlines of the hood are then established so that as much refuse as possible is thrown directly into the high velocity section of the hood throat.

Spindle Moulder or Shaper

One of the most difficult machines to exhaust effectively is the vertical-spindle moulder, when used for general jobbing work. Because of its adaptability for a great variety of work, the hood on this type of machine must be fully adjustable, and as flexible in positioning as possible. Telescopic joints are used in branch connections to the main duct. The efficient operation of this hood depends on the care taken in its adjustment to suit the various jobs in operation. A hood pushed out of the way to accommodate large patterns cannot be effective. In view of the likelihood of improper hood adjustment or positioning on many occasions during the average run of different jobs on this type of machine, it is usual to include a rather high static suction when computing the air-flow data. Fig. 3 is a line sketch showing a typical shaper hood.

Circular-saw Bench

The hood for a circular saw is fixed below the table, and is shaped as a hopper type hood, Fig. 4 (*a*). In the larger machines, the hood may be fitted with side doors for easy removal of the heavy saws, and this arrangement assists in the cleaning out of chips or other bulky matter which may clog the hood throat. It is essential to ensure that the top opening in the saw bench will admit sufficient air to provide effective branch-pipe velocities for conveying the sawdust after it has been thrown into the hood mouth. If there is any reasonable doubt about this, extra air may be admitted to the branch at floor level by using the device sketched in Fig. 4 (*b*). The dead-end of the branch at low level is fitted with a removable cap having an open orifice of an area sufficient to admit the necessary air to prevent clogging. It is also a useful clean-out cap.

Bandsaw

The larger bandsaws should be fitted with two exhaust points—one on the down run of the saw blade immediately under the table, and the other at low level, from a hood enclosing the lower band wheel. The top hood removes the bulk of the coarser dust at the table, and the low-level hood deals with the finer dust which tends to follow the blade to the bottom wheel. With this machine also, an open orifice cap at low level is useful. (See Fig. 7.)

Sander Hood

Sanding operations on timber are likely to produce greater volumes of dust than grinding operations on metal, also there can be a greater health hazard from the particular abrasive used in sander wheels and bands. As a general rule, large volumes of air at low velocities will be found more effective than smaller volumes at high velocities. A spindle sander hood is similar to a shaper hood (Fig. 3). The standard type of sander drum table is exhausted with a hopper-shaped hood, similar to the saw bench Fig. 4 (*a*). The belt sander as shown in the sketch Fig. 5, is fitted with a hood at each end of the table. The top hood handles the dust immediately produced, and the lower hood deals with the carry-over dust which follows the belt. Fig. 8 shows a disc sander ventilation system.

The collection and disposal of sander dust may constitute a problem in patternshops. Where a number of sander machines is in operation, the sander dust may form quite a sizeable proportion of the total refuse to be disposed of, and in those circumstances many engineers prefer to isolate the sanding machines from the rest of the general woodworking plant, and apply to them a separate collecting system. There are numerous reasons for this arrangement—the dust exhausted from sander machines contains a considerable amount of abrasive matter from the wheels, discs, and bands, etc., and where the refuse is conveyed to the boiler house

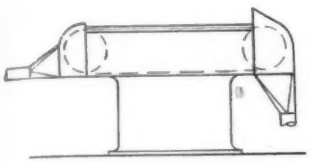


FIG. 5.—*Belt sander fitted with a hood at each end of the table.*

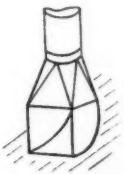


FIG. 6. — *Collection hood for floor sweepings—a type also used for miscellaneous purposes.*

for heating or steam raising, this dust can be a dangerous nuisance, as it will not burn and has been known to cause explosion in the furnace. It may also become a potential fire raiser in passing along the lines of ducting, due to its frictional character (particularly with installations where the wood refuse passes through the fan on its way to the collector). Where the sander dust forms only a very insignificant proportion of the total, and where it would be economically difficult perhaps to deal separately with one small isolated unit, its collection could be included in the main ducting system, but generally, better results are possible by exhausting the sander machines into one of the many efficient proprietary fabric-filter collectors.

Floor Sweeps

A popular unit for the collection of floor sweepings is shown in Fig. 6. As the name implies, the primary purpose is to dispose of floor sweepings, but such items can be used effectively to serve miscellaneous machines which may be difficult otherwise to provide with hoods, as, for instance, some lathes, drills, horizontal borers, etc. The chippings are first swept to the floor and then readily disposed of by the floor sweep unit. As the floor sweep is often in use when at least a portion, if not the whole of the plant is shut down, it is not essential to include every floor sweep in the computation of air-volume requirements. Where a number of floor sweeps are provided in the larger installations, a proportion should be included in the compution of total air volume, depending on the circumstances of the individual plant. A blast-gate damper should always be fitted, so that the floor sweep can be shut off from the rest of the equipment when not in use.

Pipes and Ducts

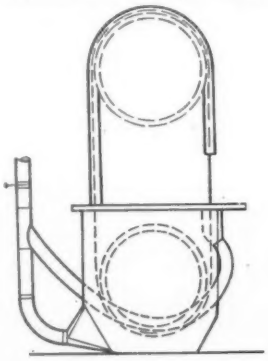
In the method and procedure to be followed for deciding main- and branch-duct sizes, due allowance for the resistance of bends, junctions, etc., should be added to the resistance of straight piping and the total resistance head obtained. A conveying velocity of 4,000 ft. per min. in the main duct will as a rule be found adequate to deal effectively with wood refuse. Ample clean-out doors should be included near junctions, at the end of long straight runs of ducting, and also at all points where blocking is likely to occur. Again, it must be emphasized, connections to machines must be made with care, and designed to allow ample adjustment and easy removal for maintenance. Hoods should be readily removable, and branch connections made with either telescopic or flexible pipes as may be necessary.

The entrance angle of branches to a main should not be abrupt, about 15 deg. is recommended. Blast gate-dampers fitted to the machine branches, permit any machine not in use to be shut off from the main suction system. The standard type of cyclone will be found an effective terminal collector for general wood waste, its resistance factor can be readily obtained from the makers.

Fan

For handling wood waste, the use of the radial or paddle-blade fan is recommended. This fan has approximately six blades, mounted either on a central boss, or a backplate, giving plenty of channel room, and the wood waste, sawdust, etc., may pass through the fan if so desired, without much danger of damage to the fan wheel. When the fan is installed in front of the cyclone, this latter will discharge the separated wood waste directly into the open air, into storage hopper, dump, or boiler house, as may be desired.

The ducting system may be a high-level installation passing more or less over the various machines, or it may be for the greater part concealed in floor channels or chases below the workroom floor. There is something to be said for and against both arrangements. With the high-level system, all or most part of the ducting layout is visible and accessible for inspection and maintenance; on the other hand a cluttering nest of pipe-work, mains and branches, is seldom a thing of beauty to the eye. With the concealed arrangement, the main duct-work is out of sight below the floor, giving a neat, clean and tidy layout, when properly done, but inspection, maintenance, cleaning-out and general attention may be more difficult. The



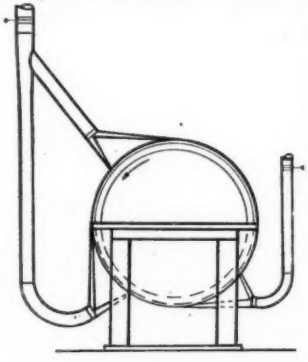


FIG. 7 (LEFT).—*Exhausting device for a vertical bandsaw, incorporating an open orifice cap at low level.* FIG. 8.—*Disc-sander ventilation system.*

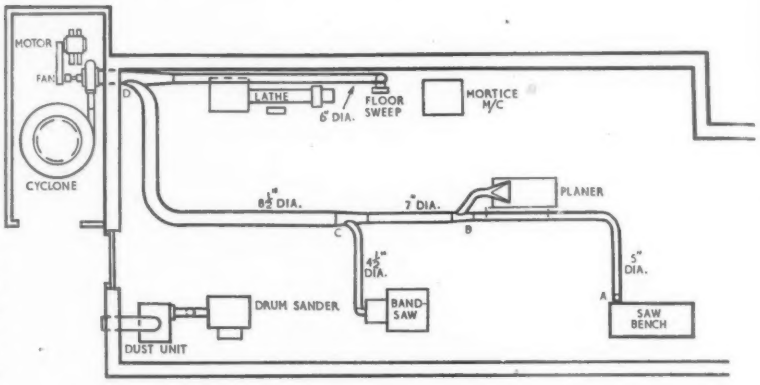


FIG. 9.—*General layout of patternshop machinery and the relative sizes of ducting provided.*

choice is best left to the individual patternshop manager.

Example in Design

The foregoing will now be illustrated by a worked-out example in design. The example does not refer to any particular plant, but is included to show the various steps in approaching a design problem. It is assumed that the patternshop is of an average foundry, with the following equipment:—

Circular-saw bench, planer, bandsaw, mortice machine, lathe, and drum sander. The general layout of such a group of machines is shown in Fig. 9.

For the purpose of this example it is proposed to deal with the refuse from the lathe and mortice machine by means of the floor sweep, and to exhaust the sander into a unit-type dust-collector. Diameters of the hood branch connections are assumed as:—

Circular saw bench, 5 in. dia.; planer, 5 in. dia.; bandsaw, 4½ in. dia.; sander, 4½ in. dia.; and floor sweep, 6 in. dia. Each branch would have a blast gate-damper to enable it to be shut off from the rest of the system when in use.

The floor sweep might have a damper, or a flap cover at the opening kept shut by the suction in the system. Sizes for the ducting will be decided upon by applying the method of cumulative areas, and the ducts will deliver into a cyclone as the terminal unit. It could be assumed that the machines will work intermittently and it is unlikely that all would be in use together for any lengthy period.

A start is made with the circular-saw bench, this being the machine farthest away from the fan, and the one forming the "index" hood. Incidentally, being the "index" hood it is the only hood branch where, at the commencement of calculations, the air-volume flow-conditions can be estimated with any degree of accuracy. Using the *static suction method*, when Q is the quantity or volume; C the coefficient of entry (0.82); A the area of the branch in sq. ft.; and h the static suction in inches w.g.; then:—

$$Q = 4{,}000\ C.A.\ \sqrt{h}$$
$$= 4.000 \times 0.82 \times 0.1364 \times \sqrt{1.5}$$
$$= 547 \text{ cub. ft. per min.}$$
$$\text{Velocity} = \frac{Q}{A} = \frac{547}{0.1364} = 4010 \text{ ft. per min.} \ldots$$

and the velocity head will be taken as 1 in. w.g. The ducting system is then dimensioned generally as shown in Fig. 9.

Note.

The allowance of 1.5 in. w.g. static suction is included to cover the velocity head plus the velocity head lost at the hood branch, the latter being approximately 0.49 velocity head. As the velocity head is 1 in. w.g., the allowance of 1.5 in. w.g. will be adequate.

Resistance A-B.

21 ft. of 5 in. dia. pipe, plus two bends = 39 ft.

Allow 45 dias. per vel. hd. $\frac{39 \times 12}{5} = 93{\cdot}5 =$ 2·08 V.H. = 2·08 in. w.g. 2·08 + 1·5 = 3·58 in. w.g.

The total resistance of the planer branch should equal this to balance as near as possible for good working, thus:—

9 ft. of 5 in. pipe plus two bends	= 1·4 vel. hd.
One junction	= 0·2 „ „
Hood loss, plus vel. hd.	= 1·5 „ „
	3·1 vel. hd.

Vel. hd. $= \frac{3{\cdot}58}{3{\cdot}1} = 1{\cdot}15$ in. w.g. and branch vel. = 4290 ft. per min.

Volume = vel. × area = 4290 × 0·1364 = 586 cub. ft. per min.

Volume now entering the 7 in. dia. main will be 547 + 586 = 1133 cub. ft. per min., and the velocity in 7 in. dia. main $= \frac{1133}{0{\cdot}2673} = 4238$ ft. per min. which will be ample to maintain wood refuse in the air stream. By this check back to the planer hood, it is seen that this method of cumulative areas for deciding the sizes of mains should work out satisfactorily.

Returning now to computation of total resistance in the main ducting system, there are:—

Main B-C.

7 ft. of 7-in. dia. pipe $= \frac{7 \times 12}{7} = 12$; $\frac{12}{45} = 0{\cdot}26$ vel. hd. 0·26 × 1·2 = 0·312 in. w.g.

Total resistance of branch "C" = 3·58 + 0·312 = 3·892 in. w.g.

Bandsaw Branch.

Resistance = 11 ft. of 4½ in.-dia. pipe + one bend = 1·15 vel. hd.
One junction = 0·2 „ „
Vel. head plus hood-loss = 1·75 „ „
3·10 vel. hd.

$\frac{3·892}{3·10}$ = 1·25 in. w.g. = 4472 ft. per min. velocity.
Q = vel. × area = 4472 × 0·1104 = 494 cub. ft. per min.

Main C-D.

Volume = 1133 + 494 = 1627 cub. ft. per min.

Resistance = 16 ft. of 8½-in. pipe + one bend = 25 ft.

$\frac{25 \times 12}{8·5} = \frac{300}{8·5}$ = 35 dias.:— $\frac{35}{45}$ = 0·78 vel. hd.

Vel. = $\frac{Q}{A} = \frac{1627}{0·3942}$ = 4127 ft. per min. and vel. hd.

$= \left(\frac{V}{4000}\right)^2$ = 1·061 in. w.g.

Resistance C-D = main duct = 0·78 vel. hd.
junction = 0·2 „ „
0·98 vel. hd.

1·061 × 0·98 = 1·04 in. w.g.
Total resistance at " C " = 3·892 in. + 1·04 in. = 4·932 in. w.g.

Floor Sweep.

The floor sweep may or may not be working simultaneously with the other machines, but for the sake of completeness the volume flow conditions at this branch will be investigated. Assuming the other machines are all working, the total resistance in the floor sweep should balance that in the main at junction " D " which is 4·932 in. w.g.

Resistance:—23 ft. of 6 in. dia. pipe + one bend = 32 ft. = 1·42 vel. hd.
Junction plus hood-loss = 2·00 „ „
Velocity head = 1·00 „ „
4·42 v. hd.

$\frac{4·932}{4·42}$ = 1·11 in. w.g. = vel. hd.; velocity = 4230 ft. per min.
Q = vel. × A = 4230 × 0·1964 = 831 cub. ft. per min.

Inlet to fan.

Volume = 1627 + 831 = 2458 cub. ft. per min.; assume 10½ in. dia. pipe.

Resistance

3 ft. of 10½-in. dia. pipe:— $\frac{3 \times 12}{10·5} = \frac{36}{10·5}$ = 3.43 dias., $\frac{3·43}{45}$ = 0·076 vel. hd. = 0·076 in. w.g.

Resistance at the fan = 4·932 + 0·076 = 5·008 in. w.g.

The resistance of the cyclone must be added, and this would be approximately 2 in. w.g., bringing up the total resistance to 7 in. w.g. as a round figure.

The power input required will now be computed by an alternative method thus:—Volume, say 2500 cub. ft. per min., against 7 in. w.g.:

Air h.p. = $\frac{5·2\ HQ}{33000} - \frac{5·2 \times 7 \times 2500}{33000}$ = 2·75

Fan h.p. allowing 65 per cent. efficiency 2·75 × $\frac{100}{65}$ = 4·2.

Allowing 70 per cent. efficiency for motor and drive,

4·2 × $\frac{100}{70}$ = 6 h.p.

Fan duty becomes 2500 cub. ft. per min. against 7 in. w.g. with 6-h.p. motor. The cyclone is arranged as the final terminal unit on the delivery side of the fan, and so it will discharge directly to atmosphere, into a storage bin or other receptacle as required. The cylone outlet will have a slide-type shutter, similar to a blast gate valve, to close it off when necessary.

Drum Sander.

The Drum Sander is exhausted into a unit dust collector, and air volume required would be computed as follows:

Volume = Q = C × A × 4000 × $\sqrt{h}$ = 0·82 × 0·1104 × 4000 × $\sqrt{1·5}$ = 443 cub. ft. per min

Vel. = $\frac{Q}{A} = \frac{443}{0·1104}$ = 4012 ft. per min. and vel. hd. say 1 in. w.g.

Resistance

Vel. hd. + hood loss 1·49 vel. hd.
6 ft. of 4½ in. dia. pipe plus two bends 1·42 „ „
Dust-collector unit 0·59 „ „
3·50 vel. hd. = 3·5 in. w.g.

The dust-arrestor unit complete with fan and motor, would handle, say 450 cub. ft. per min. at 3·5 in. w.g. The general ducting system may be installed at high level, *i.e.*, above the machines, or at low level under the floor. In the latter arrangement, the patternshop floor must be constructed with covered channels or " floor chases " to take the metal ducting.

TABLE I.—*Relationship between Pipe Diameter and Air Volume*

Pipe dia. (in.)	Air Volume. Cub. ft. per min.
3	200
4	350
5	550
6	800
7	1100
8	1400
9	1550

Table I will be found a useful guide when making spot estimates of expected volumes from different sizes of machine hood-connections.

Book Reviews

L'Emailage de la Tôle d'Acier et da La Fonte (Enamelling of Sheet Steel and Cast Iron), being a teaching course for the enamelling industry. Published by Editions Technique des Industries de la Fonderie, 12 Avenue Rachael, Paris XVI; price 1,850 frs.

It is interesting to note from this report of a meeting of representatives of the French vitreous-enamelling industry that the first meeting ever held in France did not take place until 1949 and that the only other meeting was held in Lyons in January 1951. Meetings of French enamellers are held over a period of about eleven days and papers are given by a dozen of the foremost authorities on enamelling in France. The subjects covered are many and detail is exhaustive.

The opening lecture of the 1951 conference concerns the physio-chemistry of enamels and an interesting section sets out the characteristics of all the constituents used in enamel. The practice and the theory of enamelling appear to vary little from their British counterparts, but whilst cover-coats are similar to ours, their ground-coat appears to differ considerably, *i.e.*, normally-fired ground-coat is green, under-fired is blue and over-fired brown as against the dark blue of normal British ground-coat, the light blue of under-fired and the black of over-fired ground-coat.

Lectures cover both the enamelling of sheet and cast cast iron and deal with the manufacture of frit, the milling of enamels, the pickling of sheet steel, drying and drying rooms, fusing, furnace technique and the use of titanium in enamel and blast cleaning, whilst one lecture concerns the duties of foremen and overseers. Other lectures deal with the methods of manufacturing sheet steel, the production of grey-iron castings and the manufacture of abrasive blasting materials. The use of both chilled iron grit and chilled steel grit for sand-blasting is cited and it would appear that there is no regulation in France to prevent the use of sand for metal cleaning. In the lecture on the preparation of castings, cupola practice and the preparation of sand for moulding is discussed in detail.

A discussion on faults in enamel shows that French enamellers' troubles are almost identical with our own but an interesting point is a statement that defects caused through touching unfired enamel with the fingers are really due to a small percentage of the colouring oxide in the enamel actually being removed, thus any subsequent cleaning off of these slight marks does not cure the trouble, as the oxide is not replaced by this treatment.

B. B. K.

Interim Report on the Shell-moulding Process, by J. L. Rice, B.Met. Published by the Association of Bronze and Brass Founders, 69, Harborne Road, Edgbaston, Birmingham, 15. Price 5s. (or 3s. to members of the Association.)

This is unquestionably a masterly review of the present position of shell moulding made after a three-month survey. The subject is dealt with in 14 sections, and in three of these equipment is dealt with and the available machines listed and analysed, and thus the Report makes quite a good directory of suppliers. This also applies for manufacturers of resins. The reviewer is particularly pleased with the author's remarks on the future of the process. Whilst the Report stresses the need for reduction in the costs of sand and resin, he does not mention the possibility of using facing and backing sands, which Bailey pointed out in his paper on the subject. The Report, which is equally applicable to ferrous and non-ferrous work, can be wholeheartedly recommended as a worthwhile contribution to the ever-growing literature on the subject of shell moulding and is good value for money.

Fluid Friction Co-efficients by J. R. Finniecome. Published by Emmott and Company, Limited, 31, King Street West, Manchester, 3; price 10s. net.

It is one of the misfortunes of foundrymen that they have to be on occasions engineers, metallurgists, statisticians and quite a few other things, in addition to dealing with normal foundry problems, of which there are plenty at the best of times. On some of these extra occasions, the foundryman is concerned with the subject of flow of fluids. This is a field in which it is dangerous to rely on guesswork, and far better to have the facts correct. This little booklet summarizes some of these relevant facts, as described in the title, which are essential in flow calculations. Admittedly, the book is intended for a specialist in the field rather than for foundrymen. The latter would be well advised to keep a reference to the book handy, when this particular need arises. Foundrymen in the normal course of events will not be referring frequently to the data given in this book.

" Material Handling in Works Stores (2nd Edition); The Fork Truck and Pallet System " by L. J. Hoefkens. Published by Iliffe & Sons Limited; price 18s. net (postage 6d.).

The second edition has been greatly enlarged and revised, keeping abreast of this rapidly-developing subject. The systems and methods in use at the plant have been under constant review and many improvements and new procedures adopted; these changes are explained in detail and their results carefully assessed. New sections are included dealing with the handling of bar material, fork-lift-truck maintenance, operating costs, and training of drivers, while a number of appendices containing useful reference material have been added.

The book is well illustrated by photographs showing various stages of a stores system in operation, special attention being paid to representative types of fork-lift trucks for different duties.

Practical Engineer's Pocket Book. 65th Edition. Published by Sir Isaac Pitman & Sons, Limited, Parker Street, Kingsway, London, W.C.2; price 12s. 6d. net.

The only real test of the worth of a pocket reference book is whether it gives favourable response to continual search for data or formulæ. The reviewer, sitting in his office, makes tests from the limited number of subjects with which he is familiar, and praises or criticizes accordingly. As a result of such a test, his recommendation is that the section on cast iron is due for revision. However, the fact that the book has attained its 65th edition is evidence that the volume must be responding to the current needs of the engineer.

Mechanical World Year Book, 1955. Published by Emmott & Company, Limited, 31, King Street West, Manchester, 3; price 3s. 6d. net.

The section devoted to cast iron is most satisfactory, and does present a proper picture of the modern properties of this material to the engineer. This fact lends strength to the assertion in the preface that a thorough revision has taken place. The book retains all those features which time has proved to be useful to those in search of reliable engineering data.

NEWALL ENGINEERING COMPANY, LIMITED — Mr. E. K. F. Swayne has been elected a director.

Research into the use of Tannin-base Corebinders

Interim Report

This is an account of research undertaken at the North Herts Technical College, Letchworth, into the use of tannin-base corebinders. The research began as a result of a suggestion by the Forestal Central Laboratories, Harpenden, Herts, that a cold-setting bonding agent formed from tannins might prove suitable for corebinding. The binder consists essentially of a tannin-formaldehyde resin formed by reaction between a tannin extract and formaldehyde. The tannin extract is a natural product extracted from the wood of the Quebracho tree or the bark of the Mimosa tree and normally used for tanning leather.

Programme of Research

The first problem tackled, since very little data of any kind was available, was necessarily that of determining a suitable percentage of tannin-formaldehyde resin for a core mixture. Since, in other work of the Forestal Laboratories, 5 per cent. of the tannin weight of paraformaldehyde and 7½ per cent. of the tannin weight of *p*-toluene sulphonic acid (as a catalyst) had been used, it was decided to add these substances in the same proportions to the cores; in fact, this has become standard practice in all subsequent tests, and these three substances, in the proportions mentioned, are hereafter together called the "tannin mix."

For each mixture 5 lb. of Erith silica sand was taken, and mixed with the necessary additions in a small Fordath mixer, the mixing time being normally 2 min. when dry, plus 4 min. wet. Initially, a straight resin/sand mixture was made, in order to determine the necessary further additions; the green bond of such a mixture was found to be very low, and as a consequence bentonite was added to the extent of 4 per cent. and water to the extent of 5 per cent., whilst the tannin mix percentage was varied from 1 to 4 per cent. A further mixture was made with 2 per cent. tannin mix, 2 per cent. bentonite, 2 per cent. Kordek, and 2½ per cent. water. Standard 2 by 2-in. dia. specimens were produced from the mixtures and allowed to air-dry. It was found that the centres of the specimens of the 1 per cent. tannin mixture were still soft after 48 hours, and that, although drying was more rapid in the case of the 4 per cent. tannin mixture, it was still much too slow for normal use. A tendency towards stickiness was noticeable in all mixes, and, indeed, is still one of the major problems. Paraffin was applied to the specimen tube and to the coreboxes to overcome this.

Modifications Introduced

Since it was obvious from the initial research that the slow evaporation rate of the water was causing the slow drying of the specimens, it was decided to use methylated spirits for a series of mixtures instead of water. A 3 per cent. tannin mix was used, together with 2 per cent. bentonite, 2 per cent. Kordek, and 2½ per cent. methylated spirits. This sand showed good green-bond, the outer skin toughening quickly. One specimen was dried by placing it upon a lighted paraffin rag, and after some 3 min. or so of drying in this way, the specimen was found to be extremely hard throughout. It was therefore decided to dry all future specimens in the oven. Unfortunately, the oven used is one intended for use at much higher temperatures, and its use at the low temperatures required for core-drying, leads to large differences in temperature at different points in the oven, and the temperature stated—as given by the oven pyrometer—is approximate only.

Since the specimens were to be oven-dried, the methylated spirits was replaced by water in the mixtures. A 3 per cent. tannin mix was standardized, and proportions of the other substances varied in order to ascertain the optimum proportions. In an attempt to reduce stickiness, paraffin was added to some mixtures instead of some of the water, but with very little improvement. Proportions of bentonite and Kordek were varied, to be standardized eventually at 1½ per cent. bentonite plus 2 per cent. Kordek. Various proportions of water and methylated spirits were tried. It was found that the addition of methylated spirits, whilst appreciably reducing stickiness, decreased the flowability of the sand, and tended to make it friable when dried. In some mixtures 1 per cent. of the tannin weight of tricresyl phosphate was added as a "spreader," but with little effect. At the present, a mixture has been determined which seems to give a reasonable compromise between flowability and freedom from stickiness, containing 3 per cent. tannin mix, 2 per cent. Kordek, 1½ per cent. bentonite, and 2½ per cent. water. The ingredients are mixed dry for 2 min. the water is added, and mixing continued for a further 4 min. Specimens dried at an indicated temperature of 250 deg. C. for about 6 min. in the oven mentioned above are found to be hard throughout. The tensile strength averages about 60 lb. per sq. in., although one figure of 200 lb. per sq. in. has been recorded. Permeability figures of 170 to 200 are common. Cores have been used in castings made in both phosphor-bronze and aluminium alloy, and have been found to function satisfactorily in all ways.

Future Investigations

The tannin resin has recently been produced as a solution in water which needs no catalyst or hardener. Some investigations have already been made on mixtures bonded with the resin in this more suitable form, and although it is yet too early to make any definite statement on the matter, present indications are that a satisfactory mixture should be obtainable.

(*Continued overleaf at the foot of col.* 1)

GEC Contracts

A contract for a turbo-blower to be installed at the Clyde Iron Works, Glasgow, of Colvilles, Limited, has been awarded to the Fraser & Chalmers Engineering Works, Erith (Kent), of the General Electric Company, Limited.

The output of the machine is to be 75,000 cub. ft. of dry air per min. at 60 deg. F., at a delivery pressure of 25 lb. per sq. in. The turbine—a multi-stage, single casing, high-pressure machine—will be supplied with steam at 270 lb. per sq. in. gauge at a total temperature of 750 deg. F. and drive the four-stage centrifugal blower at 2,750 r.p.m.

The control of the machine will be by a constant volume anti-surge regulator of the Askania type. The contract includes surface condensing plant and auxiliaries.

It is also announced that a contract worth $2,500,000 has been awarded to the GEC for extensions to the telephone system of Haiti, in the Caribbean. A large part of the contract consists of street cable and poled routes, the material for which is to be supplied by Pirelli-General Cable Works, Limited, an associate company of the GEC.

Oxygen Plant Order

A contract worth more than £300,000 for a large-tonnage oxygen plant to be installed at Corby has been placed with Butterley Company, Limited, Derby, by Stewarts and Lloyds, Limited. The plant will be to the design of Air Products, Incorporated, of Allentown, Pennsylvania, from which the Butterley Company holds the manufacturing rights from Britain, certain European countries, and the British Commonwealth.

The plant, which will be capable of producing 200 tons of 99.5 per cent. purity oxygen per day, will be the biggest of its type to be installed in this country. It will be used for the big increase in steel output planned by Stewarts and Lloyds. The contract was secured in the face of competition from German, French, and other British firms.

Research into the use of Tannin-base Corebinders

(*Continued from previous page*)

Summary of Conclusions

It is felt that tannin-based corebinders are capable of extensive applications in the foundry, particularly if the present major problem of stickiness can be overcome. The cost of the resin itself is low, but the obvious advantage of these binders from the economic viewpoint is the short stoving time necessary, which will facilitate greater rates of core production, and substantially reduce fuel costs.

Acknowledgments

The encouragement and active help given by Dr. White and Mr. Knowles, of the Forestal Research Laboratories, Harpenden, are acknowledged with grateful thanks, as is the assistance rendered by various members of the foundry classes at the North Herts Technical College, Letchworth, and in particular by Mr. John Schippel.

House Organs

Bradley's Magazine No. 60 (December). Issued by Bradley & Foster, Limited, Darlaston.

This issue contains a review of Basic Cupola Melting and an article on Japanese Shippo Art Enamelling. Both are really interesting.

Campfond No. 142. Campfond is the bulletin of the *Consorzio Nazionale Approvvigiona-menti Materie Prime per Fonderie Ghisa* (via della Posta 3, Milan, Italy), which roughly translated means the "national consortium for the supply of raw materials for the iron foundry." This issue is interesting, as for the first time it lists the composition of special British pig-irons and tells where they can be obtained.

Stantonian, vol. 19, No. 3. Issued by the Stanton Ironworks Company, Limited, Near Nottingham.

The issue contains a detailed description by Mr. W. S. Matthews, the company's training officer, of the highly developed system and facilities for the training and education of apprentices. Excellent hostel, workshop and bathing accommodation has been provided. Since the inauguration of the "centre," seven years ago, 471 boys have received training—a very encouraging record.

European Zinc-Alloy Die-Casting Bulletin. No. 1, Autumn 1954 (English edition). Published by the Zinc Development Association, Lincoln House, Turl Street, Oxford.

This issue is mainly confined to the die-cast grilles on British cars and to the use of zinc-alloy die-castings as components for various types of European motor vehicles. The news value of this Bulletin was impaired by reference to future events which had already happened when the copy became available to the reviewer.

News Letter No. 1, December, 1954. Issued by the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham, 2.

This six-page booklet, in bound mimeographed form, gives an impressive statement as to what has been accomplished since the Birmingham Exchange and Engineering Centre opened last June. It is pleasing to read the efforts being made to keep this permanent exhibition alive. The Centre is becoming increasingly popular as a meeting-place for technical organizations, and for special displays by industrial concerns. This bulletin is to appear monthly in future.

ABE Marine-engineering Acquisition

An offer has been made by Associated British Engineering, Limited, to purchase the whole of the issued share capital (102,651 ordinary shares of £1 each) of British Polar Engines, Limited. Shareholders have signified their intention to accept the offer and arrangements are proceeding for ratification.

British Polar Engines manufactures two-stroke marine-propulsion Diesel engines in the 200-b.h.p. to 1,900-b.h.p. power range and industrial and marine auxiliary engines from 110 b.h.p. to 1,930 b.h.p. These applications are used in vessels of all types, including cargo and passenger liners, tugs, coasters, and trawlers. Business will be continued on the present lines.

IT IS ESTIMATED that the 1954 output of nickel will reach the record figure of 174,107 tons. During the year the production of Ni-Resist has shown an increase.

Strickle-frame Coreboxes

By "Checker"

When only a small number of cores is required of one particular type, it often occurs that the shape is such that a simple frame and strickle will answer the purpose satisfactorily. In these instances, the coreboxes are produced more quickly, and there is also a considerable saving in timber.

Fig. 1 illustrates this method of making half a corebox for a round parallel-sided core. The construction comprises two ends which are true half-circles, and two sides which are shallow in depth. These sides are screwed to the ends ensure that the correct length of core is obtained. Inside parts of these sides are made to fit around the half-circular ends where they meet and conform to the correct core shape.

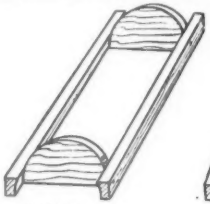


FIG. 1.

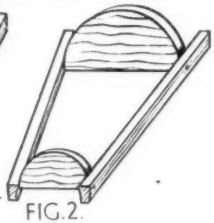


FIG. 2.

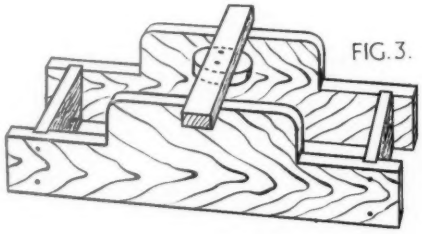


FIG. 3.

FIGS. 1 TO 3.—*Examples of various types of strickle-frame coreboxes.*

Fig. 2 shows a similar construction for a corebox, except in this instance it is for a round core having a regular taper in its length. The two end-parts are made to the correct sizes inside the corebox, and are tapered to the right degree on their edges, to allow the straight sides to be screwed into position without difficulty. In both these examples, the remaining shape of the half cores is produced by using a straight strickle which rests on the end pieces and is moved around.

The example shown in Fig. 3 has shaped sides with a boss fixed to a bar on the top. This bar is positioned by dowels at each end which protrude into the corebox sides, and is worked loose. To ensure that the two sides are identical for both shape and dimensions, it is an advantage to cut them out together. This is easily accomplished by first nailing the two pieces together at each end. Then after squaring the bottom edge, mark out, cut to shape, and finish off to the lines.

Rules of Construction

It is a general principle with these types of framed coreboxes to recess the sides about ¼ inch to allow the ends to fit in. This gives a firm and definite hold to the frame, providing a much stronger job than when a butt joint is used. However, in some instances, the butt joint is employed, with pieces of wood glued and screwed on at the outside corners where ends and sides meet. In this instance, the straight strickle is worked off the sides to give the finished core shape.

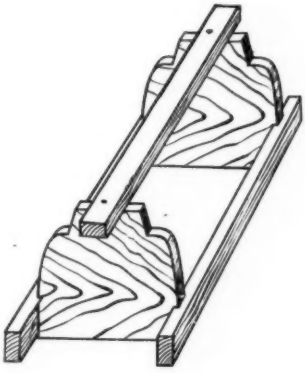


FIG. 4.—*Frame corebox which needs a strengthening bar across the ends.*

It sometimes happens when making coreboxes of this kind for small numbers of cores, that a strengthening piece must be included along the top to hold the ends rigid. This as a rule only applies when the ends are high and likely to get broken, or be rammed out of position. Fig. 4 shows a corebox which needed a strengthening bar across the two ends to secure them firmly. It will be noticed that no bottoms have been included on any of the coreboxes shown. This is an advantage when making the cores, for they can be positioned on a suitable flat core-plate, which will subsequently be used for carrying the core to the drying oven. They can then be rammed up, the top strickled, and the frame withdrawn, leaving the core on the plate ready for removal to the core oven.

MR. DAVID BROWN, of the David Brown Group, has announced that he has taken over the specialist coach-building firm of Tickford, Limited, Newport Pagnell, Buckinghamshire. He said that since body-building is the major bottle-neck of the specialist car industry, the deal would provide a safeguard for his group's Aston Martin and Lagonda cars. The firm already provides the bodies for the Lagonda car, and Mr. Brown said bodies for the Aston Martin car would probably also be made there, after the factory has been extended. Tickfords, a firm which started 134 years ago, designed and built the body for the Duke of Edinburgh's three-litre Lagonda drop-head coupé.

BRITISH OILFIELD EQUIPMENT COMPANY, LIMITED, Bofec Works, Jack Lane, Leeds, 10, is expanding its production facilities to manufacture additional oilfield equipment to the specification and designs of the Cameron Iron Works, Inc., POB 1212, Houston, Tex., USA. They will also deal with the sales of this equipment which is not at present made in this country. The British Oilfield Equipment Company, Limited, was formerly owned jointly by Heenan & Froude, Limited, Worcester, and the Brush Group, Limited, London. It will now operate as a subsidiary of Cameron Iron, following the disposal by Heenan/Brush of their financial interests in the company.

New Equipment

Heavy-duty Air-line Coupling

A new heavy-duty air-line coupling with a shockless valve action has been put on the market by Pneumatic Components, Limited, Eyre Street, Sheffield. Completely airtight, simple, and efficient and trouble-free in operation, it caters for pressures up to 300 lb. per sq. in.

Back pressure is slowly and automatically released on disengaging the male or hose fitting, thus eliminating the danger of built-up pressure. The swivel feature prevents kinking of the hose. Steel parts are heavily plated.

Aiding Bulk Storage

Storage walls provide the solution to many industrial bulk-storage problems. Walls made from reinforced concrete are supplied by Marley Concrete Products, Peasmarsh, Guildford, Surrey, in standard size units 7 ft. high by 2 ft. wide, and two types are available. One is designed to hold materials reposing at an angle of 35 deg. at maximum loading pressure up to 50 lb. per cub. ft. These include coal, coke, and other solid fuels, slag and ashes. The second type—also suitable for use as retaining walls and loading platforms—is intended for pressures up to 100 lb. per cub. ft. Materials in this category include sand, lime, cement, and minerals.

Special units with metal straps to give additional support at the corners can be supplied for 90-deg. angles and intersections. Radius units with a 10-deg. mitre are available for curved sites.

Automatic Chain Lubricator

A new type of automatic chain lubricator designed for use with all types of chain conveyors, is now being produced by Clarke Chapman & Company, Limited, Gateshead-on-Tyne. The lubricator, which is arranged to work in conjunction with chain sprocket wheels, can be engaged or disengaged, assembled or dismantled, as a complete unit, while the conveyor is running. All mechanism is totally enclosed inside an oil-tight aluminium case which forms an oil bath providing splash lubrication for the mechanism itself. Various sizes of lubricator are available, depending upon the number of teeth in the sprocket wheel and the pitch of the chain, but with two lubricators fitted at the tail end of a conveyor the increase in overall width is normally never more than 18 in. When necessary, the lubricators can be fitted at the drive end of the conveyor.

The lubricator units are mounted on a stationary stub-type axle, the conveyor sprocket wheels, mounted on bearings, being free to rotate on the axle. Although the centre portion of the lubricator can slide along the axle, it cannot rotate, as it is locked radially by a square formed at the axle end, the casing of the lubricator being free to rotate round the stationary centre.

Equally spaced inside the casing are the injector rams, and mounted directly above each ram is a rocker arm and plunger, these varying in number according to the size of the lubricator. The pitch and pitch-circle diameter of the plungers correspond to the chain pitch and the sprocket wheel pitch-circle diameter. Each plunger is spring-loaded and fitted to the end of the plunger is a special bell-mouthed self-centring nipple connector. At the outboard end of the lubricator casing is a collector manifold, for collecting and distributing lubricant to each of the injector rams, which are fitted with non-return valves. A short length of high-pressure flexible piping (shown in Fig. 1) runs between each ram and its nipple connector and a relief valve is incorporated at the nipple connector end of each pipe. This valve is set at a higher pressure than the supply pump feed, so that as the lubricant is pumped to the lubricator it forces out and fills each of the injector rams. The lubricator unit is engaged by means of a hand lever (Fig. 1), which slides the whole unit along the axle. Two pins which are fixed to the lubricator casing then engage a steel driving ring formed as part of the chain sprocket wheel.

As the lubricator casing rotates, each rocker arm is raised in turn and pushes forward its plunger, the self-centring end of the plunger engaging at the correct moment with a chain nipple. The lubricant is then forced by the injector rams at high pressure through the nipple into the chain link pin. As the lubricator continues to rotate, each rocker arm and plunger is withdrawn and each injector ram is recharged with lubricant. The length of time the lubricator unit is left engaged depends upon the length of the conveyor and the chain speed. If the conveyor chain stretches or wears, thus increasing the chain pitch, the self-centring nipple connectors automatically adjust themselves, accommodating up to $+\frac{1}{4}$ in. on the pitch of the chain. Provision is also made for adjusting the lubricator if wear takes place on the chain sprockets.

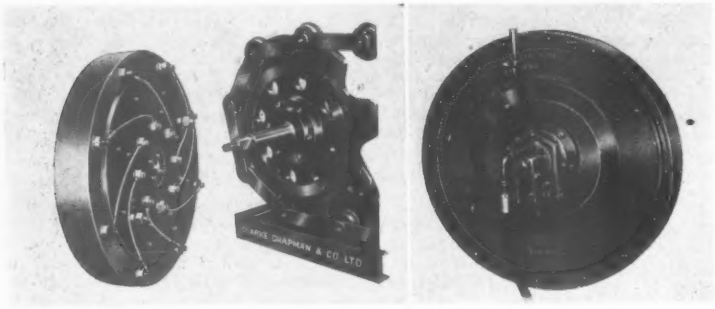


FIG. 1.—*Automatic chain lubricator (left) showing method of fitting to the sprocket wheel. (right) Front view of the lubricator.*

NORTHERN ALUMINIUM COMPANY, LIMITED, announce that their Birmingham-area sales office has removed to 14, Bennetts Hill, Birmingham, 2. The telephone number and telegraphic address remain unchanged.

PETTERS, LIMITED, oil- and petrol-engine manufacturers, have opened new premises at Walker Square, Cowal Street, Glasgow, N.W., as a sales and service depot.

Accidents in Foundries*

The following has been extracted from chapter six of the Annual Report (1953) of the Chief Inspector of Factories which deals with "Accidents in Special Industrial Groups" and commences with the sub-head "Foundries"

Table I gives the numbers of fatal and non-fatal accidents in foundries during the six years since 1948.

Following a decrease in 1949, and three years of fluctuation, there is a sharp decrease in the total. These figures, however, mean little unless related to the level of activity in some way or other. The sharp decrease in 1953 reflects a reduction in the personnel employed in the industry and a certain amount of short-time working. It is difficult to relate the accident figures numerically with the numbers employed because accidents in foundries are classified as such even if the foundry in which they occur forms only part of an establishment whose chief product is a more finished article. The general opinion of Inspectors, however, is that the considerable effort which is being put into accident prevention is showing results. Accident rates for individual foundries in terms of reportable accidents per 1,000 workers per year are very high. Figures of 60 and more appear for large iron foundries, and it is not suggested that these are in any way exceptional. For metal founding generally, the international frequency rate for firms making returns this year (1953) appears as 2.76, corresponding to 60 accidents per 1,000 which disabled the worker beyond the day or shift of the occurrence. (Naturally the figure for reportable accidents would be less than this, as an accident does not become reportable until more than three days' disablement has elapsed since the day of the occurrence.) In other words, there is a great deal of scope for further accident-prevention work.

The main causations of accidents in 1953 are shown in Table II. The last column in this table shows the relative importance of the various causations.

TABLE II.—*Main Causations of Foundry Accidents*, 1953.

Causation.	Number of accidents.	Percentage of total.
Handling goods	3,290	33.0
Molten metal, etc.	1,349	13.5
Power-driven machinery (excluding transport)	1,121	11.2
Struck by falling body	1,038	10.4
Use of hand tools	901	9.0
Persons falling	697	7.0
Stepping on objects, etc.	632	6.3
Transport	356	3.5
Other	615	6.1
Eye accidents (included under other headings)	779	7.8

Table III shows the trend of some of these causations for the six years since 1948.

TABLE I.—*Accidents in Foundries*, 1948–53.

1948.		1949.		1950.		1951.		1952.		1953.	
Fatal	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal
29	12,482	20	11,003	24	10,740	22	11,033	31	11,232	20	9,979

The trends of all these causations follow closely the trends of the totals — it is not possible to single out any as showing signs of increases or decreases definitely attributable to causes other than trade fluctuation.

Handling Goods

In common with the rest of industry, this causation is by far the most important. The commonest type of injury appears to consist of strains. Trapping, *e.g.*, between sections of moulding boxes, is another common cause. Cuts and abrasions, not otherwise serious, cause many cases of sepsis, rendering the accident notifiable. Inspectors comment on the number of elderly workers seen in foundries, particularly jobbing foundries, whose continued employment as craftsmen is valued for their experience, and note a number of hernias occurring due to weight lifting or heavy handling. The impression is gained that such workers may fail to gauge correctly their abilities in weight handling as they grow older. Injuries due to handling rough castings

* See also page 1 of this issue.

TABLE III.—*Causations of Foundry Accidents*, 1948–53.

	1948.	1949.	1950.	1951.	1952.	1953.
Power-driven machinery	1,503	1,349	1,323	1,396	1,337	1,121
Molten metal and other hot and corrosive substances	1,709	1,472	1,412	1,531	1,556	1,349
Use of hand tools	1,157	1,097	1,076	1,005	1,083	901
Struck by falling body	1,259	1,063	1,058	1,120	1,107	1,038
Handling goods	4,354	3,707	3,658	3,760	3,743	3,290
Eye accidents (included also under other headings)	1,027	896	945	885	912	779

or other articles likely to produce cuts and abrasions would in some cases have been prevented by the wearing of gloves, now required by the Iron and Steel Foundries Regulations to be provided.

Progress in mechanization will, it is hoped, materially reduce the number of "handling goods" accidents, but the impression is gained that careful study of handling processes would be valuable even if extensive mechanization schemes cannot be undertaken.

In discussing mechanization, inspectors point out that direct comparison between existing mechanized and non-mechanized foundries can be very misleading. There is a greater percentage of skilled labour in foundries doing non-repetition work compared with that in the large specialized foundry (which lends itself much more readily to mechanization). The pace of the work is usually slower and the average age of workers higher in the former. Also the tonnage of output is usually much less per worker. A further illustration of the difference between the mechanized foundry and foundries taken as a whole may be seen if the causations in Table II are compared with those in Table IV, which comes from a large mechanized iron foundry employing about 2,000 persons.

The most important causation here is "Struck by Falling Body," with "Handling Goods" second. Notable features of this causation pattern are the small numbers of machinery accidents and molten-metal accidents. The relatively high proportion of "Struck by Falling Body" accidents is thought due to articles falling off conveying machinery of various kinds.

Molten Metal and other Hot and Corrosive Substances

It is well known that these accidents are always painful, sometimes followed by sepsis and occasionally severe or fatal. Apart from molten metal, hot sand is the other substance most often concerned.

Accidents at cupolas are conspicuous by their severity. One causing burns which proved fatal occurred due to the unexpected opening of the bottom door while the cupola contained molten metal. The bottom door was held in position by a steel prop, which engaged a horseshoe-shaped socket welded to the centre of the door. The prop rested at the lower end on a flat steel plate, which was packed up off the floor by means of two firebricks. This prop slipped sideways and allowed the bottom door to come down about 8 or 9 in. at one side, permitting the molten cast iron to be discharged over the floor. Subsequently, a special horseshoe socket has been fixed to the floor so as to prevent a similar occurrence. The dropping of a cupola bottom at the end of a working period requires great attention if serious accidents are to be prevented.

Two serious accidents occurred in non-ferrous foundries, caused by the failure of plumbago crucibles. In both cases, the crucibles were being lifted or carried by hand-shanks, and in one case the bottom fell out and in the other case the crucible fractured circumferentially. Both the crucibles involved were quite new.

Metal Carrying and Pouring

A number of serious accidents occurred in connection with the transport of ladles of molten metal, in one case failure in a bolt attaching the ladle to a transporting roller unit caused the ladle to fall, with serious consequences. Again, the handle of a bogie ladle snapped behind the safety catch as it was being wheeled away from the cupola, causing the ladle to fall over on to its side, spilling the contents on to three men, who were seriously burned. Another serious accident in connection with a large ladle occurred as it was being conveyed by crane from one mould to the next. The flow of metal was controlled by a stopper in the base of the ladle, which in turn was governed by an external handle. An eye bolt was provided for securing the stopper in the closed position, but apparently it had been the practice to make this finger tight, which did not prove sufficient in this case, and the partial release of the stopper allowed molten metal to flow.

Accidents during pouring continue to be serious. A fatality occurred in an iron foundry in somewhat obscure circumstances when an ingot mould of about 40 tons in weight was being cast in a concrete pit 9 ft. deep in the foundry floor. The mould was built up of firebrick faced with loam in a box 7 ft. square and 10 ft. 6 in. high, constructed of ribbed iron castings bolted together. The box was

TABLE IV.—*Accidents at a Mechanized Iron Foundry Analyzed by Causation.*

Process.	Lifting machinery.	Other power-driven machinery.	Other vehicles, excluding hand trucks, bogies, etc.	Electricity.	Fires (not dangerous occurrences or explosions)	Molten metal; other hot or corrosive substances.	Use of hand tools.	Struck by falling body.	Persons falling.	Stepping on or striking against objects.	Handling goods or articles in manufacturing or carrying processes.	Other miscellaneous accidents.	Total.
Moulding and core-making ..	—	—	—	—	—	—	1	15	2	—	5	—	23
Casting ..	—	—	—	—	—	1	—	—	1	—	—	—	2
Fettling ..	1	—	—	1	—	1	5	7	1	3	3	—	22
Other ..	—	—	2	—	1	1	2	6	4	6	10	1	33
Total ..	1	—	2	1	1	3	8	28	8	9	18	1	80

packed with sand in the pit up to approximately 4 ft. from the top. The main pouring had been completed when metal was seen to be running out through a crack in one side of a casting near the top. When the metal met the damp sand used for packing the mould box there was a violent explosion and a supervisor who was on the mould was fatally burned. It was found afterwards that the cast-iron box had opened out from the top almost to the bottom down the centre of one side, and practically the whole contents of the mould had discharged themselves. There were slight indications that the cast-iron plates might have been cracked before assembly. The gas release holes were completely blocked. In an operation of such potential danger, the utmost care in preparation is, of course, necessary. Splashes sometimes occur at open moulds during pouring because the moulds have cooled down unduly after preheating, allowing condensation to take place. In continuous-casting machines in non-ferrous foundries the movable bottom plate of the mould is unavoidably somewhat damp when casting is commenced, owing to the effect of the water cooling system; preheating of this type of mould is, of course, not practicable, and very careful and slow pouring is necessary at the beginning of a cast to prevent water-vapour from being trapped and causing a blow-out. An experienced caster was injured by neglect of this precaution. Other accidents occurred because of blow-outs due to blockage of vent holes in sand moulds. In one Scottish district only one accident occurred during the year as a result of the spurting of metal from V-pin moulding boxes. Both management and employees are aware of the danger, and the aperture between the V-pin and the side of the box is now either sealed with concrete or packed with sand by the moulder before casting.

Power-driven Machinery—Sand Preparation

A crop of severe accidents is reported in which persons put their hands into the delivery openings of sand-mills or sand-slinging machines. In this class of machinery, the risk is not open to view and secure fencing is required at all delivery points through which access can be obtained to impellors or other moving parts. A fatal accident occurred at an inclined bucket-type sand elevator when a man who had been clearing sand from the bottom of the pit was found inside the pit trapped by the bucket. Sand-conveyor belts have also caused serious accidents—in some cases persons have climbed over rail fencing to clear up spillage or to prevent sand adhering to the end drum and have become trapped at various dangerous parts. In other cases the dangerous traps are in labyrinths below the foundry floor and local fencing has not been provided.

Moulding Machines

Accidents still occur at the traps between the top plate and the moulding box of pneumatically-operated machines. In one foundry, a dual control-button system has been fitted on these and as a further precaution a pivoted arm has been arranged to free the second control only when the top plate is in position over the box. In another case, the design of the machine was open to criticism. If the head was not pulled round, the table carrying the moulding box could rise to the top of the guides on which it travelled, and the locking nuts at the top of the guides were insufficient to restrain the table against the full pressure. As a precaution, a valve had been fitted on the pressure line, which should have been opened by the head as it was moved into position and should have closed when the head was removed. This in fact failed, and the locking nuts also failed and the table flew up and struck the operator.

Abrasive Wheels

One fatality is reported due to a burst grinding wheel, and the Inspector comments on the inevitable rough usage accorded to abrasive wheels in foundries and fettling shops. Another accident occurred due to the bursting of a portable wheel used for cutting-off risers, the wheel being fabric-reinforced and regarded by the makers as almost unbreakable. For this reason, the makers had provided no guard. Fortunately, however, the occupier had fitted a guard, and this undoubtedly reduced the severity of the injuries which the operator sustained when the wheel burst into fragments. Accidents caused by abrasive wheels, whether caused by bursts, contacts with the wheel, eye accidents or otherwise, were the most numerous class of power-driven machinery accidents.

Miscellaneous Plant and Machinery

A number of serious accidents arose in connection with lifting machinery, electrical equipment, ladders and other machinery and plant not specifically associated with foundries. Among foundry-equipment accidents, the following are interesting. One explosion occurred in an oil-fired continuous core-stove—probably due to the fact that the chambers in the up-cast shafts could be completely closed, allowing an accumulation of inflammable vapours. A serious accident occurred on an electraulic press used for truing castings. The wrong bottom-die was in use on the machine and the injured person attempted to hold the casting in position on the die. A part of the casting broke and the injured person's finger and thumb were trapped and amputated. Since the accident, the firm has fitted a two-button control on the machine in addition to the foot pedal, but the provision of an interlocked guard has been urged.

Falling Articles

Two avoidable fatal accidents occurred—one when a 2½-ton casting overbalanced and the other when a stack of mould bottom plates, each weighing about 4 tons, had been built up to a height of about 10 ft. on a bed of loose, dry sand. Part of this bed was removed soon afterwards by a mechanical digger, and a squad of men was then sent to shovel away more of the sand from the floor only 6 ft. from the stack. After a short time, the sand began to run and the whole stack collapsed, killing one of the men before he could escape. The

Accidents in Foundries

disregard of ordinary common-sense precautions in this case was almost incredible. Several other serious accidents occurred due to careless stacking of materials.

Falls of Persons

Falls on the flat caused by tripping over, slipping, etc., formed the major cause of these accidents. This does not reflect well on the standards of housekeeping. Of other falls, falls from high boxes during ramming and falls into casting pits are conspicuous. The adoption of rail fencing or covers for pits has been pressed.

Foot Accidents

These are divided broadly into two groups, viz., article dropping on the foot and splashes of molten metal or hot sand entering the footwear. A high percentage of both could be prevented, or would have been less severe, if asbestos spats and safety boots were worn. Of the reported foot injuries, a considerable proportion show injuries to toes. This again confirms that a substantial proportion of foot accidents would be prevented by wearing safety boots. In foundries in which very great emphasis is laid on the wearing of safety boots, the accident records show unmistakably the beneficial effect of this practice. In some areas there is a considerable resistance by foundry workers to the wearing of moulders' boots or safety boots. There is no need, however, for any defeatist attitude in the campaign to get protective footwear adopted, and the Chief Inspector is confident that the right kind of leadership and example will in time overcome the conservatism or prejudice of workers in this matter.

Eye Accidents

These are discussed in another section of the Report. Splashes of molten metal are the main eye hazard in iron foundries and also in non-ferrous foundries. In steel foundries, grinding with portable tools is the chief hazard.

Shell-moulding Meeting

The Association of Bronze and Brass Founders are organizing a meeting at the Clarendon Restaurant, Hammersmith, London, W.6, on Thursday, January 20, 1955, commencing at 7.15 p.m., at which a report on shell moulding will be given by Mr. J. L. Rice, B.MET., of the British Non-Ferrous Metals Research Association. Mr. Rice acts as shell-moulding adviser under the advisory service scheme of the A.B.B.F., and has undertaken several months' investigation of the shell-moulding process.

The meeting is open to all bronze and brass founders, who may also take advantage of the services of Mr. Rice under the advisory service scheme; applications should be made to the secretaries of the Association of Bronze and Brass Founders, 69, Harborne Road, Birmingham, 15. The meeting will be preceded at 4 p.m. by a meeting for member-firms only; dinner will be available at 6 p.m.

Acknowledgments

The receipt of diaries, calendars, Christmas cards and gifts is gratefully acknowledged from the following:—

David Brown Companies; British Industrial Plastics, Limited; F. Turnbull & Company (Engineers), Limited; Tube Investments, Limited; Eyre Smelting Company, Limited; Gas Council; International Alloys, Limited; Holman Bros., Limited; E. M. Currie; H. Hendra & Son; Monsanto Chemicals, Limited; Cowlishaw, Walker & Company, Limited; Marco Conveyor & Engineering Company, Limited; Frazer & Chalmers Engineering Works; Frank Rowe; Institute of British Foundrymen (John Bell); R. L. Handley; Pyrene Company, Limited; Western Manufacturing Company, Limited (Calcutta); Widnes Foundry & Engineering Company, Limited; J. Stone & Company (Charlton), Limited; Stewarts and Lloyds, Limited; United Steel Companies, Limited; British Bath Company, Limited; Incandescent Heat Company, Limited; Fielding & Platt, Limited; British Oxygen Company, Limited; Tin Research Institute; Pont à Mousson; Leicester, Lovell & Company, Limited; A.P.V.-Paramount, Limited; Northern Manufacturing Company, Limited; S. Russell & Sons, Limited; Foundry Suppliers, Limited; Dr. R. Genders; F. H. Lloyd & Company, Limited; Newman Industries, Limited; G. A. Tomkinson; F. C. Evans, F.I.M.; J. Hobkirk, Sons & Company, Limited; E. V. Deeley & Company, Limited; Northern Aluminium Company, Limited; Ruston & Hornsby, Limited; Allied Ironfounders, Limited; August's, Limited; Institution of Production Engineers; Educational Productions, Limited; Thermix Industries, Limited; Bradley & Foster, Limited; John Sissener (Norway); Baron Krayenhoff (Holland); Bonvillain & Ronceray; Fairbairn Lawson Combe Barbour, Limited; Joint Iron Council; K. & L. Steelfounders & Engineers, Limited; Almin Limited; Catton & Company, Limited; Nuffield Foundry, Wellingborough; Davidson & Company, Limited; Stein & Atkinson, Limited; Collins Carter (USA); Aluminium Development Association; Stavanger Electro Staalverk, A.G.; Frodair Iron & Steel Company, Limited; British Insulated Callender's Cables, Limited; Quentin Lumsden, British Iron & Steel Federation; Polygram Casting Company, Limited; Fulmer Research Institute; Cupodel, Limited; British Industrial Plastics, Limited; Foundry Services, Limited; W. Tait; J. C. Spargo; Birlec, Limited; J. Timbrell; F. E. Tibbenham; Precision Presswork Company, Limited; Bjorn Langum (Norway); B. Waters; Technical Foundry Centre T.N.O. (Netherlands); DECHEMA (Germany); G. & R. Thomas, Limited; Tangyes, Limited; A. Kremener (Israel); K. Jewson (Hobbies, Limited); O. Smalley, O.B.E. (USA); W. O. Adams, F.R.S.A. (Australia); W. A. Gibson (Australia); W. H. Harper; Western Foundries, and J. E. Prendergast.

UK Ratifies Tin Pact

Ratification of the international tin agreement has been effected on behalf of the United Kingdom by Sir Anthony Eden. The same document declared the separate participation of Malaya and Nigeria. The agreement was negotiated at Geneva at the end of 1953, but previously only Australia, Canada, and Denmark of the signatories to the draft had ratified the pact. It is believed, however, that other countries are only awaiting constitutional processes.

CHAMBERLIN & HILL, LIMITED—Mr. M. M. Hallett has been appointed managing director.

Dynamic Stresses in Overhead Travelling Cranes

A series of tests carried out on three, lattice-type electric overhead travelling (EOT) cranes to determine the impulsive effects due to the sudden hoisting and lowering of loads were described in a paper presented by Mr. E. Lightfoot and Dr. B. L. Clarkson to the Institution of Mechanical Engineers on November 26. Dynamic strains were measured from electric-resistance strain-gauge recordings taken during the tests, the stresses being computed from these strains.

Describing the loading of a crane girder during hoisting and lowering, the authors point out that the highest dynamic stresses in the hoisting motion are usually caused by the action of "snatching" a load from the ground or from a support. After the load has been connected to the hook, there is a certain amount of slack in the tackle and the motor has time to build up speed while winding it in. The load may be snatched at any speed up to the maximum. The magnitude of the consequent impulsive effect depends on the speed of snatch, the flexibilities of the hoisting tackle and the crane, and the masses of the load, crab, and girders. Dynamic stresses are also set up by sudden braking while the load is being lowered. This braking produces an approximately constant deceleration of the load which may be regarded as an effective dynamic force on the girders. The resulting stresses are usually smaller than those due to snatching at maximum hoisting speed. Release of the load to the ground sets up only small dynamic stresses in the girders.

Conclusions

In the course of their conclusions, the authors state that the highest dynamic stresses in an EOT crane during normal usage on good rails, *i.e.*, those resulting from the action of hoisting a load, may be related to the steady stress by means of an overall dynamic factor, D, depending on the speed of hoisting, deceleration (if any) during hoisting, stiffnesses of the tackle and girder, and masses of the girder, crab, and load lifted. The form of the stress-time curve during hoisting may be determined fairly closely by an analysis based on a double-spring conception. This method assumes a linear load-extension for the tackle and no damping in the system and, consequently, over-estimates the value of D to a small extent. The action of braking while lowering a load sets up dynamic stresses in the crane girder, which are usually lower than those due to snatching. The magnitude of the dynamic factor for braking while lowering depends on the deceleration produced and the crane characteristics. The theoretical analysis based on the double-spring conception, state the authors, closely predicts the form and magnitude of the experimentally determined stress-time variation for braking while lowering.

MUREX, LIMITED—Mr. David A. L. Smout has been appointed a director.

Dorman Long's Bridge Contract

A tender by Dorman Long (Bridge & Engineering), Limited, for a single-span steel bridge and approaches across the River Volta (at a cost of approximately £750,000) has been accepted by the Government of the Gold Coast.

Situated at Adomi, two and a half miles north of Sanchi, the bridge will carry two lanes of traffic on a 22-ft. wide roadway. It will have short reinforced concrete approaches and about five-and-a-half miles of new approach roads are included in the contract. The main arch span will be 805 ft. long and 38 ft. wide and its ribs, made of high-tensile steel, will have a rise of approximately 173 ft. The total weight of steel involved in the contract is about 1,200 tons.

The bridge will be ready for traffic during the early part of 1956. The river is at present crossed by means of a ferry which handles over 200 vehicles a day.

The consulting engineers are Sir William Halcrow & Partners, and Freeman, Fox & Partners, both of London.

N.C.B. Joins Equipment Users' Association

Both the National Coal Board and the Metal Box Company, Limited, have recently become associate members of the Engineering Equipment Users' Association. The British Transport Commission joined in the same capacity on January 1.

The association was formed in 1949, to provide members with means of exchanging information on the standardization of engineering materials and equipment which they used in common. In this way, they present their co-ordinated views as users of such materials and equipment.

Associate members obtain technical benefits without the same financial and manpower obligations as full members.

French Mill Contract for Sheffield

A contract for a bar and continuous rod mill for the production of precision alloy steel bars and rods in straight lengths and coils has been placed with the Brightside Foundry & Engineering Company, Limited, Sheffield, by the Société Métallurgique d'Imphy, of France. Provision is also made for the plant to roll strip. The new plant will be located adjacent to existing mills at Imphy (Nièvre).

The value of the mechanical equipment is considerably over £500,000 sterling. The contract provides that some parts are to be made in France to the Sheffield company's designs.

Société Métallurgique d'Imphy, formerly known as S.A. Commentry-Fourchambault et Décazeville, is well known for its high-quality alloy steels and operates blast furnaces, open-hearth furnaces, and electric furnaces, rolling mills, forges, and foundries.

Change of Address

Riley Stoker Company, Limited, announce that with effect from January 1, their Midland-area manager, Mr. A. J. Salter, can be reached at their new branch office at 43, Burton Road, Melton Mowbray, Leics, the telephone number being Melton Mowbray 495.

Lighting Installation Maintenance

"In industrial and commercial establishments, the allowance which has to be made for inevitable depreciation, together with the cost of cleaning fittings and replacing lamps, may amount to one third of the total expenditure on lighting." This statement was made by Mr. W. Robinson, B.Sc., lighting officer, of the British Electrical Development Association, in the course of a paper, "Maintenance of Lighting Installations" which he read to a meeting of the Illuminating Engineering Society, at the Lighting Service Bureau, at 2, Savoy Hill, London, on December 14. The paper was presented jointly by Mr. Robinson and Mr. J. W. Strange, Ph.D., of Thorn Electrical Industries. They said it might be more realistic to state that depreciation was, at the present time, increasing the cost to industry of useful light by at least 50 per cent. Observations, arising out of visits to a wide variety of factories, suggested that this was most probably an under-estimate. Grime-encrusted reflectors were a familiar sight, even in progressive plants, and instances of systematic maintenance were few. Cleaning was often only carried out when the dirtiness of lighting fittings had become apparent, just as lamp replacement was often delayed until lamp failures compelled action in the matter.

This attitude to lighting maintenance was to some extent understandable, in view of the fact that it was unlike most other plant maintenance, which had a preventive function and whose neglect might have very serious consequences. The consequences of neglecting lighting installations, however, were only regarded as serious by those who attached importance to the maintenance of a minimum service value of illumination. The proportion of factories where this applied must be very small indeed, judging by the small number in which light meters were regularly used.

Clean Reflectors Important

The relatively rapid initial rate of depreciation from the clean state was an invariable characteristic of the normal industrial lamp reflector, and it was very likely that it was connected with the destruction of the specular component of reflection associated with enamelled surfaces. This component might account for 10 per cent. or more of the light output from a clean reflector, and even a very thin layer of dust would eliminate it.

Tests showed that over intervals of 12 months, cleaning the lamps had a much smaller effect than cleaning the reflectors. Results obtained in a pattern-shop revealed a significant exception to this tendency. In this case, both the lamp and reflector were coated with fine sawdust. The particles were sufficiently light in colour to produce little effect on the reflector, while being individually fully opaque to the lamp output. It was clear that wherever light-coloured dust was predominant simple lamp cleaning played an important part in the cleaning procedure.

Recent investigations in this country and the United States, into the depreciation of electric lighting-fittings, had revealed among other features, that ventilation of open fittings had a decisive self-cleaning effect which profoundly affected the economics of lighting maintenance, and the performance of a lighting installation. It was also pointed out that cover-glasses did not necessarily reduce the rate of lighting depreciation. Tests had, in fact, shown that they often made the position worse unless they were properly sealed.

BRIGGS MOTOR BODIES, LIMITED—Mr. J. Torontow has resigned from the board and from the service of the company.

Romance of a Leicester Firm

One Sunday morning in the summer of 1871, two men walked down Church Gate, Leicester, turned into Buttclose Lane, crossed the street and, at No. 73, stopped to read the notice in a shop window which stated: "This warehouse and property to let." These men were Samuel Bailey Goodwin and William Barsby, both foremen at local ironmongers, and on the spot they decided to rent the premises and start in business on their own as ironfounders, subscribing £250 each to the partnership.

That Sunday-morning decision was responsible for the founding of the Leicester ironworks firm which is known to-day as Goodwin Barsby & Company, Limited, and enjoys a world-wide reputation. The story of the firm's progress, is graphically told in "Over My Shoulder and Beyond," by Mr. Eric Pochin, the present managing director of the firm. Mr. Pochin is a direct descendant of Robert Pochin, who owned an ironmongery shop in Granby Street, Leicester, and who in 1879 went into partnership with Samuel Goodwin and William Barsby when the title of the firm was changed to its present form.

Crushing and Quarrying Plant

The author, dealing with the early history of the firm, tells how the prosperity of the business was tied up with the industrial expansion of Leicester and the driving force and foresight of Robert Pochin. In 1887, the firm took over the concern trading as Charles Mason & Company, whose premises were in Watling Street, Leicester, and who were well known at the time as makers of agricultural implements. Just before being taken over by Goodwin Barsby & Company, the Watling Street firm had started to make quarrying machinery. With the growing demand for limestone and gypsum by the building trade, Robert Pochin was quick to realize there would be a great demand for stone-crushing machines. From 1879 the firm made steady expansion and is now one of the most important British concerns in the production of quarrying and road-making plant.

Speaking at a dinner of the firm's Quarter Century Club on December 10, Mr. Eric Pochin referred to the recent amalgamation of Goodwin Barsby & Company, Limited, with Aveling Barford & Company, Limited. After remarking that the old family concerns could not last for ever, he said there was a "great and widening future" for the concern of which he was chairman. He went on to say that the firm had been finding it difficult to cover the world market, and that amalgamation with Aveling Barford could be most helpful, because that firm had representatives living in various parts which it was desired additionally to cover.

Film Review

The Sea Shall Test Her. This pleasing film has been produced for the British Iron and Steel Federation for general showing. By means of a series of excellent shots of shipyards and of the launching and sailing of modern steamships, the paramount importance of steel is vividly shown, yet completely unobtrusively. The commentary and background music are alike extremely meritorious. The film runs for about 17 min. and real interest is aroused and maintained throughout.

H. & J. QUICK, LIMITED—Mr. Edwin R. Foxlow has been elected to the board.

Stewarts and Lloyds' Dividend

A dividend of 12½ per cent. is announced by Stewarts and Lloyds, Limited, for the 52 weeks to October 2, as forecast when the shares were offered to the public in June. The group trading profits in the year have fallen slightly to £12,180,000 from £12,870,000 in the previous year. The forecast of profits, however, in June was about £10,000,000, and the excess is stated to be due to greater stability in export prices than was expected and the improvement in general trade in the second half of the year. Total taxation is down from £7,800,000 to £5,900,000 and the net profits have, therefore, risen by £1,250,000 to £6,280,000.

Production of pig-iron by the UK group amounted to 1,581,000 tons in the year under review, against 1,575,000 tons previously, and that of steel ingots to 1,188,000 (1,231,000) tons. Of 462,000 (458,000) tons of spun-iron pipes and castings produced, 19.27 (20.32) per cent. was exported, while 27.3 (29.4) per cent. of the output of 756,000 (814,000) tons of steel tubes went to oil companies, mostly for export, and 20.4 (18.2) per cent. to general export trade.

Further progress was made with modernization, development, and extension of the UK works, £8,400,000 having been added to gross fixed assets. Net current assets of the group were lower by £2,100,000 at £12,500,000, but it was not necessary to borrow to any appreciable extent from the company's bankers.

The report and accounts will be issued on or about January 14 and the dividend paid on or about February 9. The offer for sale stated that it would be paid in January, but unforeseen difficulties arose which made the delay in payments unavoidable.

Sand Courses

The British Cast Iron Research Association has now held at Alverchurch 20 sand courses to which 176 member-firms have sent 235 representatives. The courses occupy about four days and another will be arranged in the Spring. No fee is charged. Simple methods of routine testing of foundry sands, on the lines recommended by the Joint Committee on Sand Testing, and with the control of sand in the foundry, with a view to avoiding the difficulties in castings to which sand can give rise, are dealt with. The course comprises both talks and practice in sand-testing and foundry control, and the laboratory is equipped with a complete range of the testing appliances., An executive of a member-firm, from which two representatives were sent a recent course, wrote:

"I must compliment you on a really good job of work with the foremen we sent to the sands course. They have returned to the works having picked up an amazing amount of useful knowledge, and with a new enthusiasm for sand control which is quite unbelievable."

A CONTRACT for the building of three motor cargo ships each of 5 500 tons gross has been placed with Lithgow's, Limited, Port Glasgow. The propelling machinery will be installed by John G. Kincaid & Company, Limited, Greenock.

The contract, which is one of the biggest shipbuilding orders placed in the area recently is valued at about £2,000,000, and has been placed by the British & Burmese Steam Navigation Company, Limited. The first of the three vessels is due to be delivered in 1957.

Vickers' Reorganization

Three subsidiaries have been formed by Vickers-Armstrongs, Limited—Vickers-Armstrongs (Aircraft), Limited, Vickers-Armstrongs (Engineers), Limited, and Vickers-Armstrongs (Shipbuilders), Limited. They have been formed to provide a basis for reorganization.

Vickers, Limited, announces that Sir James Reid Young, having attained the age of retirement, relinquished his executive duties and his seats on the boards of subsidiary companies of Vickers on December 31, 1954. He remains a director of Vickers & Metropolitan-Cammell Carriage & Wagon Company, Limited. Lord Knollys, who joined the board in September, 1952, is appointed deputy chairman of Vickers with effect from January 1.

Major-General C. A. L. Dunphie is appointed chairman of Vickers-Armstrongs, Limited, with effect from January 1, retaining his present office of managing director. Mr. E. J. Waddington, who relinquishes the office of secretary, joins the board of Vickers on January 1, and is appointed director of administration of that company. His office of director of administration of Vickers-Armstrongs is extended to director of finance and administration.

Vice-Admiral Sir Charles Simeon relinquished his seat on the board of Vickers-Armstrongs on December 31, 1954, having reached normal retirement age. Mr. E. P. Tomlinson is appointed secretary of Vickers from January 1, in place of Mr. Waddington.

Duke to Preside at Industrial Conference

A second meeting has been held at Buckingham Palace to make further arrangements for the Duke of Edinburgh's study conference on the human problems of industrial communities within the Commonwealth and Empire, which is to be held at Oxford in July, 1956. The meeting decided to constitute itself as an independent council for the purpose of sponsoring the conference, and made itself responsible for policy and finance. The Duke of Edinburgh accepted office as president of the conference.

In order to preserve the independent character of the conference, governments will not be formally represented. The conference will bring together about 280 men and women aged, roughly, from 25 to 45, including some 190 from the Commonwealth, with experience in the managerial, technical, and operative rôles in industry. The conference will deal with human factors in industry which fall outside the normal machinery of collective bargaining, covering such personal factors as work satisfaction, health and welfare schemes, and such social problems as industrialization creates for the individual, his family, and community.

Lilleshall Steel Sale

The entire share capital of its former subsidiary, Lilleshall Iron & Steel Company, Limited, has been purchased by the Lilleshall Company, Limited, from the Iron and Steel Holding and Realization Agency for £95,000. Lilleshall Iron & Steel, therefore, again becomes a wholly-owned subsidiary of the Lilleshall Company.

The compensation value of the shares of Lilleshall Iron & Steel which was nationalized under the Iron and Steel Act, 1949, was £129,382.

Personal

MR. DAVID A. L. SMOUT has been appointed a director of Murex Limited.

Mr. W. H. SMITH has resigned as managing director of the Falkirk Iron Company, Limited, and has been succeeded by Mr. R. G. SINCLAIR. Mr. Smith is continuing in office as chairman of the board.

RHODES, BRYDON & YOUATT, LIMITED, centrifugal-pump manufacturers, Stockport, Cheshire, announce that Mr. W. LATTA, sales manager, has been appointed a director of the company.

Mr. W. D. PUGH, a director since 1946, has been appointed to fill the new post of assistant managing director of English Steel Corporation, Limited, Sheffield.

Mr. ROBERT H. TATE, of Mirfield, was presented with a gold watch on December 24 to mark his 50 years' service with David Brown and Sons (Huddersfield), Limited. The presentation was made by Mr. A. AVISON, a director and general manager of the Gear Group.

Mr. HAROLD W. SECKER, chairman and managing director of Thos. W. Ward, Limited, Sheffield, has been elected a member of the Liverpool and London and Globe Insurance Company's local advisory board at Sheffield.

Mr. H. W. BARNETT, London manager for the Butterley Company, Limited, and its subsidiary Hughes & Lancaster, Limited, also manager of the firm's oxygen division, resigned on December 31 after 18 years' service.

AFTER 40 YEARS with the Dunlop group, Mr. FREDERICK WALKER, OBE, MIMechE, chief engineer at Fort Dunlop, retired last week. Mr. Walker is chairman of the Midland branch of the Institution of Mechanical Engineers and also a member of Council of the Institution.

IN ACKNOWLEDGMENT of his 50 years' service with Herbert Morris, Limited, of Loughborough, Mr. WILLIAM AINSWORTH, chief inspector, North Works, received a television set. The presentation was made by Mr. Frank Morris, chairman of the company.

Mr. CYRIL POYNTON has been appointed assistant sales manager of the chemical-trade sales-department of Newton Chambers and Company, Limited, Thorncliffe Works, Sheffield. He has been with the company since 1948, and succeeds Mr. A. R. RODGERS who has been appointed marketing manager to the Lawley group of potteries at Stoke-on-Trent.

Mr. ARTHUR E. STOKES, works manager of the Anglo-Enamel Works at Stourbridge of Archibald Kerrick, Limited, ironfounders, has retired. To mark his 53 years' service with the firm he was presented with a writing desk by Mr. W. E. KERRICK, director. When he began, the company was the Anglo-American Tin Stamping Company, Limited; that was in 1901. He became works manager in 1930.

MR. ARTHUR CHAMBERLAIN, managing director of the Hercules Cycle & Motor Company, Limited, on December 17 presented a gold watch to MR. P. J. LESTER, works director of the Hercules Rocky Lane factory, Birmingham, to commemorate Mr. Lester's completion of 25 years' service with the company. Mr. Lester's was the 163rd watch to be presented to employees with similar service qualifications.

Mr. J. W. RODGER, managing director of Bruce Peebles & Company, Limited, Edinburgh, has been elected president of the Scottish Engineering Employers' Association, one of the largest in Britain. He had a long and active connection, as a member of the executive committee, with the former East of Scotland Association before the amalgamation of the two associations in 1947, since when he has been a vice-president of the SEEA.

MR. J. B. THOMAS, who has been chairman of Millspaugh Limited since the company was "hived off" from Hadfields, resigned from the board on December 31 in order to reduce his business commitments. An announcement will be made later with regard to the appointment of his successor as chairman. Mr. Thomas is chairman of George Wostenholm & Son, Limited, Hargreaves & Jennings Limited, and other companies.

AT A MEETING OF THE COUNCIL of the British Iron and Steel Federation on December 21, MR. A. G. STEWART, chairman and general managing director of Stewarts and Lloyds, Limited, was appointed president of the Federation as from January 1, in succession to MR. G. H. LATHAM, chairman and managing director of Whitehead Iron & Steel Company, Limited. SIR ERNEST LEVER, chairman and chief executive of Richard Thomas & Baldwins, Limited, and the Steel Company of Wales, was appointed president-elect.

NORTHERN ALUMINIUM COMPANY, LIMITED, announce that MR. H. C. THOMAS, director and secretary, is being accorded retirement status by private arrangement with the company. It was on January 1, 1925, that Mr. Thomas, an incorporated accountant, first joined the staff of the company at their London office; prior to this he had been employed as a professional accountant with the company's auditors. He was appointed secretary in June, 1929, and was given a directorship in 1932. In 1942 he also accepted a directorship in Aluminium Laboratories Limited.

Obituary

Mr. EDWARD WILSON ELCOCK, a metallurgist in the research department of the English Steel Corporation, died on December 29, at the age of 57.

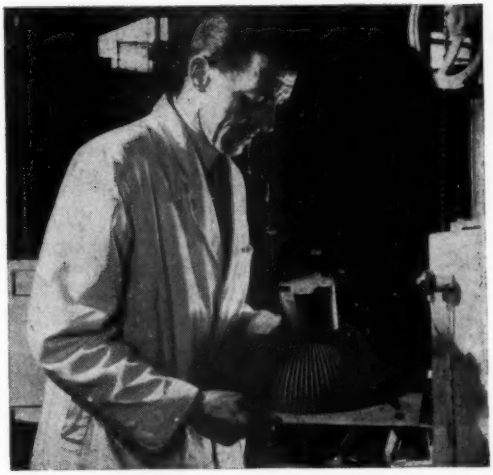
THE GERMAN PRESS announces the death of Professor MAX PASCHE at the age of 70. He was at one time a professor at the Clausthal Mining School, Freiberg, and the Technical High School at Charlottenberg, and contributed largely to foundry literature between the two wars.

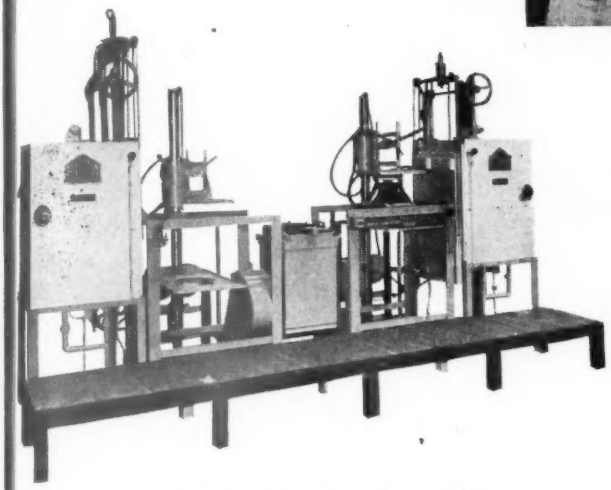
SIR ERNEST JOHN HUTCHINGS LEMON, who was LMS Divisional Superintendent at Derby Carriage and Wagon Works, from 1923-25, has died, aged 70. He joined the old Midland Railway Company in 1911, and became chief mechanical engineer in 1931. In 1943 he retired from the LMS after being vice-president for 11 years (operating and commercial). For some time from 1938 he was with the Air Ministry, and in 1942 was transferred to the Ministry of Production. Sir Ernest received his knighthood in 1941.

THE INVENTOR of machines still running at local factories at Walsall and district after nearly 40 years, MR. WILLIAM HOWARD BLUCK, of Walsall, died suddenly on December 16 at the age of 66. Few local men can have surpassed him as a creative engineer, and many factories in Walsall and the surrounding Black Country owe him a debt of gratitude for time labour saved. Mr. Bluck founded the business which bears his name in Lower Forster Street, Walsall, in 1913, and all his life was spent on prototype work, and machines envisaged by him on the drawing board came to life in his small factory.

Shell Moulding in 3D

The Shelmolda 'Altus' will handle patterns up to 13in. in height or depth and therefore will provide a greater variety of sand/resin moulds than any other machine on the British market. All the main operations are carried out mechanically and the minimum of physical effort is required from the operator.





The Shelmolda "Altus" (patent applied for)

Capacity

Effective pattern plate sizes of 16in. by 16in. and 16in. by 12in. Handles pattern plates 13in. high or 13in. deep in each oven. Will produce from split pattern 26in. overall. Oven opening adjustable up to 16in. above or below centre line.

Operation

Semi-automatic, with everything at all times under operator's full control. Oven doors, dump box and receptor pneumatically operated. Adjustable ejector mechanism. Investment time electronically controlled. Gas or electric ovens.

May we send you further particulars?

FAIRBAIRN LAWSON COMBE BARBOUR LTD. LEEDS, ENGLAND. TELEPHONE: LEEDS 32041

236/72

News in Brief

THE FIRST 24 by 36 in. shell-moulding machine made by the Shallway Corporation, Connellsville, Pa., will be delivered to General Alloys Castings Company, Rochester, Pennsylvania.

AT A CEREMONY held at Cefn Mawr, N. Wales, on December 21, 146 employees of Monsanto Chemicals, Limited, who had served for 25 or more years with the company received awards in recognition of that service.

GENERAL REFRACTORIES, LIMITED, and N. B. ALLEN & SOUTH WALES REFRACTORIES, LIMITED, announce that from December 27 their address was changed to:—13, College Street, Swansea; the telephone number is unchanged.

HEAD, WRIGHTSON & COMPANY, LIMITED, engineers and ironfounders, etc., of Thornaby-on-Tees, has acquired the whole of the share capital of F. P. Caird & Company, Limited, colliery engineering contractors, of Glasgow.

A PENSION SCHEME is being introduced by the Heenan & Froude, Limited, engineering group. About 2,000 workpeople in the group will be brought into the scheme, which will be on a non-contributory basis, or will be otherwise provided for.

NET PROFIT before taxation of the Union Steel Corporation (of South Africa), Limited, for 1953-54 is £43,079, compared with £16,319 in 1952-53. It is stated that profits for the second half of 1954 are confidently expected to exceed £40,000.

HEPWORTH & GRANDAGE, LIMITED, engineers and founders, Bradford, presented gold watches to 19 employees on December 23, on completion of 25 years' service. The presentations were made by Mr. ELIJAH HEPWORTH, chairman and managing director.

WORK on the construction of an intake weir at Glen Finglas and a tunnel two and a quarter miles long to Loch Katrine, part of a project which will make a notable addition to the resources of Glasgow Corporation's waterworks at Loch Katrine, is to begin early this year.

THE CRUISER AUSTRALIA has been purchased by the British Iron and Steel Corporation and will be towed to Britain and broken up for scrap. The 10,000-ton vessel was built on Clydebank by John Brown & Company, Limited, and was formerly flagship of the Australian Fleet.

SOME 45 MEMBERS of the Lancashire branch of the Institute of British Foundrymen visited the works of Callender's Insulated Cables, Prescot, recently. The foundry was visited, the wiredrawing seen, and also the copper works of the company. Afterwards the visitors were entertained to tea.

FORMED as a private company, Vickers-Armstrongs (Earth Movers), Limited, has been registered with a capital of £100. On the same date the three other new subsidiaries, which have been formed to take over the main divisions of Vickers-Armstrongs, Limited, were registered (see also page 21).

RUSTON & HORNSBY, LIMITED, Grantham, have presented gold watches, medals and certificates to four of their staff who recently completed 50 years' service. Mr. W. H. Minckley (foundry superintendent), Mr. W. Neal (crane driver), and Mr. A. Frisby (turner) are still working. Mr. W. Frankish (plumber) has now retired.

A SALES OFFICE has been opened by James Booth & Company, Limited, non-ferrous founders, of Birmingham, at Exchange Buildings, Quayside, Newcastle-upon-Tyne, 1 (telephone: Newcastle 29731). Mr. C. C. Barber is branch manager. Mr. C. G. Skidmore is the manager of a new sales office at 93, Hope Street, Glasgow, C2 (telephone: Central 2715).

THE WIDNES BRANCH of the McKechnie "25" Club held its sixth annual dinner and social evening at St. Helens on December 10. The club has two branches, one at Birmingham and one at Widnes, with a total membership of 296, all of whom have completed 25 years' service with McKechnie Brothers, Limited.

ELISABETH STEWART, the eleven-year-old daughter of Mr. A. G. Stewart, chairman of Stewarts and Lloyds, Limited, has given her name to a new blast furnace which has been commissioned at the company's works. Completion of "Elisabeth" marks the end of a £3,500,000 post-war modernization programme at the Bilston works.

BRITISH RESIN PRODUCTS, LIMITED, announce that Mr. T. E. Laing has been appointed a director of the company. Mr. Laing, who joined the DCL group in 1943, has been works manager and more recently general manager of the joint British Resin Products, Limited/British Geon, Limited, factories at Barry, Glamorgan, since they were built from 1947 onward.

EMPLOYEES at Firth Brown Tools, Limited, Carlisle Street, Sheffield, provided 500 presents on a Christmas tree supplied by the management, for children in the Fulwood Cottage Homes and Lodge Moor Hospital, Sheffield. The practice started four years ago when a machine operator had the idea of helping the children at Christmas in this way. The gifts are distributed in the week after Christmas.

MORE THAN 100,000 TONS of new shipping has been launched by Harland & Wolff, Limited, from its yards at Queen's Island, Belfast, for the fifth year in succession. Last year, nine ships totalling 115,447 gross tons were launched at Belfast and three vessels aggregated 30,473 tons at Govan, while naval tonnage and small craft accounted for 8,118 gross tons. Last year the company launched 133,000 tons.

THOS. FIRTH AND JOHN BROWN, LIMITED, Sheffield, distributed through their welfare department, Christmas food parcels to all old-age pensioners who were employed for over 30 years; altogether two tons of food were distributed. This is the first time the firm has distributed Christmas food parcels to its former employees: 300 were also entertained to a Christmas party in the works canteen at Savile Street.

STEIN & ATKINSON, LIMITED, have received an order for a battery of 12 soaking pits from Dorman Long (Steel), Limited, for their Lackenby beam mill. These pits will be of the well known one-way-fired type and will have Austeel-Escher recuperators for preheating both the air and blast-furnace gas. This contract is for around £500,000 and is one of the largest for soaking pits that has been placed in this country for many years.

MR. FRASER W. BRUCE, managing director of Northern Aluminium Company, Limited, has presented watches to 16 Birmingham and seven Banbury employees to commemorate their 25 years' service with the company. The men were presented with aluminium watches, weighing less than half-an-ounce each, specially made for the company by one of the leading Swiss watchmakers, and the two women received gold wristlet watches.

IT IS DOUBTFUL if the machine operators who made some cup reamers at the Mushet Works of the Osborn organization, Sheffield, knew for what purpose the tools

(*Continued on page 26*)

POLFORD FOUNDRY PLANT

CORE SAND MIXER

★ FULLY MOTORISED

★ NO SPECIAL FOUNDATION NECESSARY

★ LOW MAINTENANCE AND OPERATING COSTS

★ REQUIRES A VERY SMALL FLOOR AREA

In construction, this Core Sand mixer is robust, compactly designed; all wearing parts being easily and quickly replaceable. The works are fully protected from sand, etc.; the whole unit is totally enclosed, housed in a cast iron casing and oil bath.

Capable of mixing all types of core compounds, including semi-solids, it has an extremely high rate of output. For average compounds the mixing is completed in two or three minutes—discharging time is normally less than one minute. Capacities: ½, 1, 3, 4, 5, 6, 10, 20 cwts. per batch.

Other models in the Polford range include: Vibratory screens, portable mould driers, lip axis tilting furnaces, vibratory shake outs, rotary driers, crucible furnaces, sand conditioning plant, etc.

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(*Continued from page* 24)

News in Brief

were to be used, says a writer in the Osborn magazine, "The Hand and Heart." They were for machining human bones in surgery and the writer continues by reporting that the use of stainless steel in surgery is daily increasing; when hip bones are fractured, for instance, stainless steel can be used in their repair.

BONNINGTON CASTINGS, LIMITED, Edinburgh, has installed a new £60,000 electric melting furnace as part of a two-year programme of modernization, the total cost of which will be in the region of £150,000. Included in the development work are the addition of a new modern sand plant, a battery of 10 high-speed moulding machines, a specially designed knock-out plant, and the latest type of shotblasting equipment.

THE CORROSION GROUP of the Society of Chemical Industry will hold the annual Conversazione and Exhibition for members and their guests on Thursday, January 20, in the Battersea Polytechnic, Battersea Park Road, London, S.W.11, commencing at 6.30 p.m. The exhibition contains contributions by various companies and research organizations, which illustrate methods of preventing corrosion in the home. Sections are devoted to building materials, plumbing, domestic equipment and tools, and ornamental metalware. Films of technical interest will be shown in the course of the evening.

SAMUEL OSBORN & COMPANY, LIMITED, Clyde Steel Works, Sheffield, in association with Henry Gardner & Company, Limited, metal merchants, London, have formed a new company, Titanium Metal & Alloys, Limited, to develop the forging and rolling of titanium. Osborns have dealt with the metal for some time, and were the first in Sheffield to forge and roll it. The new company has started rolling and forging the metal and its alloys into bar and sheet, and recently cogged and rolled into bar the largest piece of titanium yet handled in this country. The largest mass the firm has yet forged has been 1,150 lb.

NEWMAN INDUSTRIES LIMITED, Yate, Bristol, announce that their range of totally-enclosed flameproof motors are now CSA approved. The Canadian approval (No. 13809) covers both the fan-cooled and the naturally-cooled models variously mounted. Newman barrel-type, steel frame, flameproof motors, designed expressly for use in the mining industry, are also covered by this CSA approval so that the complete range can now be supplied to Canada for use under Canadian hazardous duties Class 1, group D and Class 2, groups F and G. These motors are all rated to comply with B.S.168: 1936, flameproof in accordance with BS.229: 1946.

THE RESPONSE of Midland employers to the cause of safety in industry and the effectiveness of the industrial safety campaign in local factories during the past few years, were praised at the annual dinner of the Birmingham and District Industrial Safety Group in Birmingham last month. Mr. R. Bramley-Harker, Superintendent Inspector of Factories for the South Midlands, said that Birmingham employers were "above reproach" in their observance of the Factory Acts. Miss Edith Pitt, M.P., disclosed advance information from the Ministry of Labour that last year resulted in another decrease in the number of industrial accidents in the Midlands. The chairman of the group, Mr. J. Clarke, presided at the dinner.

BRITISH Diesel-engined trucks which have replaced American petrol-engined trucks at a sand quarry in South Africa have already halved fuel costs. They are three "Comet" cruiserweight tipping models which have been supplied by Leyland Motors, Limited, through its subsidiary, Leyland Albion (Africa), Limited, to the Van Ryn Sand Company, of Benoni. Fitted with 5½-cub. yd. "Morewear" bodies, they are making up to 100 trips in a 17½-hour working day. Although the longest trip is only 1,650 yards, from the sand pit to the loading bins, the quick turn-rounds mean that the 90 h.p. engine is seldom stopped, and when unloading it is kept busy operating the Bennes Marrell twin-ram tipping gear. The vehicles are seldom able to reach the higher gear ratios due to the uneven surfaces over which they are required to travel.

CANON A. P. SHEPHERD, Canon Emeritus of Worcester Cathedral, opened and blessed on December 23 an extension at the Netherton ironworks of John Barnsley and Sons, Limited. Canon Shepherd is a member of the Iron and Steel Institute. John Barnsley and Sons, Limited, traces its history back to 1701. Developments in the firm's production brought it from the manufacture of Jews harps into the field of general grey and malleable ironfounding and in the middle of last century the company began to specialize in the making of pulley blocks for which it is now famous. In more recent years, the firm has developed hand-operated lifting tackle and introduced electrically-operated overhead cranes. The extensions just opened include a new erecting and assembly shop for the fabrication of cranes, adding more than 13,000 sq. ft. of floor space.

THE MOST ELABORATE enterprise the Wolverhampton Productivity Committee has undertaken since it was formed in November, 1953, will be the two-day work-study conference which the committee is organizing at the Wolverhampton and Staffordshire Technical College on January 11 and 12. Each day, the conference will be divided into three sections at which it is expected to accommodate representatives of some 700 firms. Among the chief speakers will be Mr. Richard G. Jones, work-study officer to the British Productivity Council, and Mr. G. L. Page, industrial advisory officer to the National Union of Manufacturers. Professor T. U. Matthew, Lucas Professor of Engineering Production at Birmingham University, is to take the chair at a work-study forum; the panel will include Mr. R. W. Latham (Rubery Owen & Company, Limited); Mr. J. H. N. Thompson (John Thompson, Limited); and Mr. C. L. Old, principal of the College.

EARLY this year, Rubery Owen & Company, Limited, Darlaston, is planning to introduce special experimental courses designed to dispel young employees' fears about the effect of National service in their careers. The company has been concerned by an attitude shown among trainees—and affecting their behaviour in the workshops—that conscription means disruption of careers. The new courses are designed to show the opportunities in the Forces for carrying on with training and it is hoped to break down the fallacy that National Service means two wasted years. The courses will last two days during which all employees nearing calling up age will attend lectures given by specialist Army, Navy and Air Force officers and visit military depots where they would see at first hand the training facilities available. If the Darlaston experiment proves successful it is intended to introduce similar courses at many other other Owen factories throughout the country. At the annual apprentices' prize-distribution ceremony at which the announcement of the new courses was made, Mrs. F. L. Owen, a director of the firm, presented monetary awards worth £1,270 as well as other prizes among 231 apprentices.

'FULBOND'
TRADE MARK

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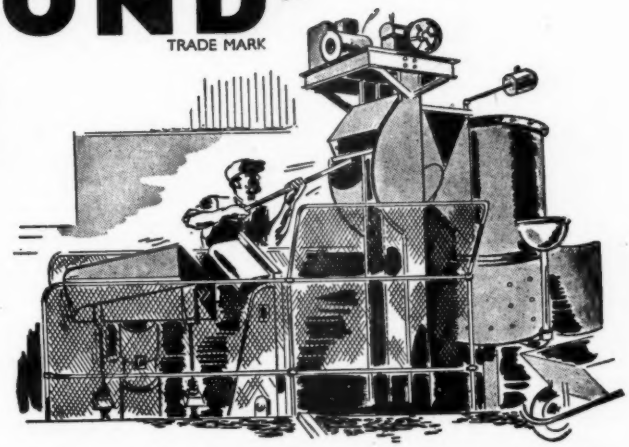
'FULBOND' develops its bond so rapidly that foundrymen can reduce milling time and increase the output of their sand mills.



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Raw Material Markets

Iron and Steel

Most of the foundries entered the new year with bright prospects. The engineering and speciality foundries are very busy and there is no sign of any slackening of the demand for the many and varied types of castings they produce for home and export requirements. In point of fact, the expected expansion in production by the motor, tractor, and allied trades will call for larger tonnages of castings. Other trades, too, maintain brisk conditions, and machine-tool makers, power-plant and electrical-equipment manufacturers, steelworks, collieries, and many other users of castings will continue to lend good support.

The jobbing foundries are sharing in the brisk trading conditions, and although the light and textile foundries are not so favourably employed, they, too, experience an all-round improvement in trade.

At present, the concern of most foundries is in acquiring adequate supplies of raw material to implement the work already on hand, rather than the booking of fresh business.

Producers are fully covered for their outputs of all grades of foundry pig-iron and hematite for some time ahead, and for certain grades the position grows more difficult from day to day.

With the expected increase in steel output during 1955, the steelworks will need still larger quantities of basic pig-iron. The foundries are finding it increasingly difficult to obtain the pig-iron they need and some grades are very short. The low- and medium-phosphorus irons are in scant supply, and there is no sign of any relief being obtained from an increase in production.

Most producers of high-phosphorus iron have sufficient orders to cover their outputs for the next month or two, but the higher production expected in the near future will increase their needs. Mechanical troubles and bad weather recently have interfered with the normal working of some furnaces.

The re-rollers opened the new year with bright prospects so far as demand for their products is concerned, but the shortage of steel semis has become a major problem. Production of heavy joists and sections and of plates and sheets is maintained at a high level.

Non-ferrous Metals

The year ended with a burst of strength, but whether these high values will be held for long during 1955 is open to doubt. Tin, which closed just below £700, has yet to come under the influence of the restriction scheme; it is reported that the plan will not be in operation for another two to three months.

Stocks are certainly building up in the U.K. and a recent return shows the Metal Exchange tonnage in official warehouses to be up again to 1,779 tons, of which 1,561 tons are in Liverpool and 214 tons in London, the small balance of 4 tons lying in Birmingham. The present price of tin is, of course, a long way below the maximum agreed at the Geneva Conference, a figure which, probably, consumers feel to be much too high. The history of restriction schemes is not such as to inspire optimism about a long-term success for tin.

In copper it is generally admitted that harm is being done to the industry by the inflated value now ruling and there can be little doubt that ground is being lost to other commodities. Aluminium, of which the price was raised by £7 to £163 on Saturday, is probably copper's chief rival and its consumption in the U.K. is rising.

On the London Metal Exchange last week, copper, after reaching £292 for cash, closed at £291, a gain of £11. Three months closed at £274 10s., a gain of £5, and the backwardation widened to £16 10s., in spite of some increase in stocks in official warehouses, which are reported at 1,200 tons. Of this about 45 per cent. is in London. Trading on an in-warehouse basis has now begun and a further increase in stocks in official warehouses is much to be desired.

Tin recovered some of the ground lost before Christmas and closed £7 up for cash and £7 10s. better for three months. A small contango was established. Lead was firm, especially for the current half month, which improved by £2 10s. to £107, while second half March was up to £104 5s., a gain of 10s. In zinc, the tone was very steady, prompt advancing 5s. to £84, while forward closed 10s. better at £82 15s.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* December 30, £290 to £292; December 31, £289 to £291; January 3, £294 to £296; January 4, £296 to £298; January 5, £304 to £305.

Three Months: December 30, £274 to £274 10s.; December 31, £274 to £274 10s.; January 3, £276 10s. to £277; January 4, £277 to £277 10s.; January 5, £284 to £285.

TIN, Standard—*Cash:* December 30, £691 10s. to £692 10s.; December 31, £697 to £698; January 3, £695 to £696; January 4, £693 to £694; January 5, £690 to £691.

Three Months: December 30, £694 10s. to £695; December 31, £699 to £699 10s.; January 3, £698 to £699; January 4, £695 10s. to £696; January 5, £692 10s. to £693.

ZINC—*Second half December:* December 30, £83 10s. to £83 15s.; December 31, £83 15s. to £84. *First half January:* January 3, £84 to £84 5s.; January 4, £84 10s. to £84 15s.; January 5, £84 10s. to £84 15s.

Second half March: December 30, £82 10s. to £82 15s.; December 31, £82 10s. to £82 15s. *First half April:* January 3, £83 5s. to £83 10s.; January 4, £83 5s. to £83 10s.; January 5, £83 5s. to £83 10s.

LEAD—*Second half December:* December 30, £105 15s. to £106 5s.; December 31, £106 10s. to £107. *First half January:* January 3, £106 to £106 10s.; January 4, £106 5s. to £106 10s.; January 5, £105 5s. to £105 10s.

Second half December: December 30, £103 15s. to £104; December 31, £104 to £104 5s. *First half April:* January 3, £104 15s. to £105; January 4, £104 15s. to £105; January 5, £103 10s. to £104.

Death of Mr. K. J. Holman

Mr. Kenneth James Holman, who was joint managing director of Holman Bros., Limited, iron, steel, and brass founders, and mining and quarrying plant specialists, etc., of Camborne (Cornwall), died on Friday at the age of 58. He had not enjoyed good health in recent years, but he was in his office on the day before his death.

Educated at Blundell's School, Tiverton (Devon), Mr. Holman studied accountancy before joining the family business at Camborne. As a director of Holman Bros. he travelled abroad extensively. He served in the first world war and rejoined the Territorial Army in the 1939-45 war. Mr. Holman took a keen interest in the Air Training Corps, an interest which earned for him the award of the M.B.E. He was an enthusiastic tennis player.

Mr. Holman leaves a widow and three sons, two of whom are directors of Holman Bros.

F.&M.

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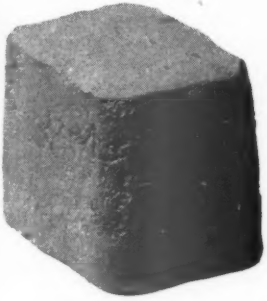

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Many cupola charges require the addition of manganese to combine with the sulphur and form the comparatively innocuous manganese sulphide. Manganese is also needed in the production of cast iron having a medium tensile strength and is essential when a steel scrap is incorporated in the charge.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

January 5, 1955

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £15 12s. 0d.; Birmingham, £15 5s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £17 13s. 9d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £18 9s. 3d.

Scotch Iron.—No. 3 foundry, £18 2s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £20 4s. 0d.; South Zone, £20 6s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £21 1s. 6d.; South Zone, £21 4s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £18 2s. 6d.; Scotland (Scotch iron), £18 9s. 0d.; Sheffield, £19 7s. 6d.; Birmingham, £19 14s. 6d.; Wales (Welsh iron), £18 9s. 0d.

Basic Pig-iron.—£15 15s. 6d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots).—40/55 per cent., £40 15s. 0d., basis 45 per cent. Si, scale 15s. per unit; 70/84 per cent., £63 0s. 0d., basis 75 per cent. Si, scale 16s. per unit.

Ferro-vanadium.—50/60 per cent., 23s. 8d. to 25s. 0d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £185 0s. 0d. to £195 0s. 0d. per ton; 38/40 per cent., £251 0s. 0d. to £270 0s. 0d. per ton.

Ferro-tungsten.—80/85 per cent., 14s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 17s. 3d. per lb. of W.

Ferro-chrome (6-10ton lots).—4/6 per cent. C, £75 0s. 0d. to £80 0s. 0d., basis 60 per cent. Cr, scale 25s. 0d. per unit; over 6 per cent. C, £74 0s. 0d. to £76 0s. 0d., basis 60 per cent. Cr, scale 24s. 0d. per unit; 2 per cent. C,* 1s. 7½d. per lb. Cr; 1 per cent. C,* 1s. 8d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. per lb. Cr; 0.06 per cent. C,* 1s. 10d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 6½d. to 7s. 1d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £225 0s. 0d. to £232 0s. 0d. per ton; 96/98 per cent., £255 0s. 0d. to £262 0s. 0d. per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 52s. 6d. to 70s. 0d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £54 15s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 5s. 0d.; tested, 0.08 to 0.25 per cent. C, £26 5s. 0d.; hard (0.41 to 0.60 per cent. C), £27 10s. 0d.; silico-manganese, £34 10s. 0d.; free-cutting, £29 6s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £32 17s. 0d.; silico-manganese, £34 10s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 13s. 6d.; basic, hard, over 0.41 up to 0.60 per cent., C, £30 16s. 0d.; acid, up to 0.25 per cent. C, £33 15s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £31 1s. 6d.; boiler plates (N.-E. Coast), £33 11s. 6d.; floor plates (N.-E. Coast), £32 10s. 6d.; sectional material, N.-E. Coast, £29 4s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £31 19s. 6d.; flats, 5 in. wide and under, £31 19s. 6d.; hoop and strip, £33 1s. 6d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £34 5s. 0d.; black sheets (hand mill), 17/20 g., £43 13s. 6d.; galvanized corrugated sheets, 24 g., £54 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £54 7s. 9d.; nickel-chrome, £76 7s. 9d.; nickel-chrome-molybdenum, £86 8s. 6d.

NON-FERROUS METALS

Copper.—Cash, £304 0s. 0d. to £305 0s. 0d.; three months, £284 0s. 0d. to £285 0s. 0d.; settlement, £305 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 33¾d. per lb.; wire, 327s. 0d. per cwt. basis; 20 s.w.g., 358s. 3d. per cwt.

Tin.—Cash, £690 0s. 0d. to £691 0s. 0d.; three months, £692 10s. 0d. to £693 0s. 0d.; settlement, £691 0s. 0d.

Zinc.—First half January, £84 10s. 0d. to £84 15s. 0d.; first half April, £83 5s. 0d. to £83 10s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £114 10s. 0d.; rolled zinc (boiler plates), all English destinations, £112 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £96 0s. 0d.

Lead (Refined Pig).—First half January, £105 5s. 0d. to £105 10s. 0d.; first half April, £103 10s. 0d. to £104 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 27½d. per lb.; rods, drawn, 36⅜d.; sheets to 10 w.g., 295s. 6d. per cwt.; wire, 34½d.; rolled metal, 281s. 9d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £190; B6 (85/15), £250; BS249, £197.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £230; HTB2 (30 tons), £236; HTB3 (48 tons), £250.

Gunmetal.—RCH, 3/4 per cent. tin, —; BS1400, LG2 (85/5/5/5), £243; LG3 (86/7/5/2), £251; G1 (88/10/2/½), £320; (88/10/2/1), £311.

Phosphor Bronze.—BS1400, PB1 (AID released), £330 per ton.

Phosphor Bronze Strip, etc.—Strip, 414s. 0d. per cwt.; sheets to 10 w.g., 436s. 6d. per cwt.; wire, 51d. per lb.; rods, 44½d.; tubes, 42¾d.; chill cast bars: solids 44½d., cored 45½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056. 3s. 6½d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 11½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 10½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £110 0s. 0d. Nickel, £519 0s. 0d. Aluminium, ingots, £163 0s. 0d.; aluminium bronze (BS1400), AB1, £288; AB2, £299. Solder, brazing, BS1845, 2s. 4d. lb.; granulated, 2s. 7d. lb.

* Average 68-70 per cent. Cr.